31 REFRENCES

Aaboe, E., H. B. Musick, G. Cooke et al. 1998-2007. Documentation of PM_{10} and $PM_{2.5}$ Exceedances January 1998-December 2007, Doña Ana and Luna County, New Mexico. Reports submitted to USEPA by Air Quality Bureau, New Mexico Environment Department.

Claiborn, C. S., D. Finn, T. V. Larson, and J. Q. Koenig. 2000. Windblown dust contributes to high PM2.5 concentrations. Journal of the Air and Waste Management Association 50:1440-1445.

COMET® Program. 2010. Forecasting Dust Storms Version 2. University Corporation for Atmospheric Research.

Countess Environmental. 2006. WRAP Fugitive Dust Handbook. Western Governor's Association.

EPA. 2011. Guidance on the Preparation of Demonstrations in Support of Requests to Exclude Ambient Air Quality Data Affected by High Winds under the Exceptional Events Rule.

Draxler, R.R., G.D. Rolph. 2013. HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) Model access via NOAA ARL READY Website (http://ready.arl.noaa.gov/HYSPLIT.php). NOAA Air Resources Laboratory, Silver Spring, MD.

DuBois, D., I. Kavouras, R. Tropp et al. 2009. Particulate Monitoring Analysis for the Paso del Norte Airshed in the United States- Mexico Border Region. Air Quality Bureau, New Mexico Environment Department.

DuBois, D., 2011. New Mexico Border Air Quality Blog. www.nmborderaq.blogspot.com accessed July-October 2013.

Herckes, P., J.O. Allen, and A. Mendoza. 2007. Investigation of High Particulate Matter Episodes in the Nogales Border Region. Project Number: A-06-6, SCERP Project Report, www.scerp.org.

Kelly, K. E., C. Jaramillo, H. Meuzeelar, J. Lighty, K. Collins, and M. Quintero-Núñez. 2007. Identifying Sources of Low Wind/High Particulate Matter Episodes in the Imperial Valley-Mexicali Region. Project Number: A-06-8, SCERP Project Report, www.scerp.org.

Li, W.-W, N.Cardenas, J. Walton, D. Trujillo, H. Morales, and R. Arimoto. 2005. PM Source Identification at Sunland Park, New Mexico, Using a Simple Heuristic Meteorological and Chemical Analysis. Journal of the Air and Waste Management Association 55:352-364.

Novlan, D.J., M. Hardiman, and T. E. Gill. 2007. A Synoptic Climatology of Blowing Dust Events in El Paso, Texas from 1932-2005. Preprints, 16th Conference on Applied Climatology, American Meteorological Society, J3.12, 13 pp.

National Weather Service, 2011. Archive of NWS Text Products. Iowa Environmental Mesonet. www.mtarchive.geol.iastate.edu accessed July-October 2013.

Pardyjak, E. R., S. O. Speckhart, and H.A. Holmes. 2008. High Particulate Matter Episodes in US-Mexico Border Cities. Project Number: A-06-03, SCERP Project Report, www.scerp.org.

Saxton, K., D. Chandler, L. Stetler, B. Lamb, C. Claiborn, and B.H. Lee. 2000. Wind Erosion and Fugitive Dust Fluxes on Agricultural Lands in the Pacific Northwest. Transactions of the ASAE 43:623-630.

Western Regional Climate Center. 2011. www.wrcc.dri.edu accessed December 2011

Appendix A

Recurrence Frequency

A.1 Historical Network Trends of PM_{10} & $PM_{2.5}$ Exceedances

The NMED AQB has documented blowing dust episodes caused by high winds for over twenty years. In March of 1988, the AQB established an air quality monitoring site in Anthony, NM in southern Doña Ana County. Due to the recorded exceedances, the EPA designated the Anthony area as nonattainment for the PM_{10} NAAQS in 1991. During the 1990's and 2000's the monitoring network expanded throughout Doña Ana County and the AQB continued to record exceedances of the standard. Recognizing that uncontrollable windblown dust events caused these exceedances, EPA allowed the AQB to develop a Natural Event Action Plan (NEAP) to protect public health in lieu of expanding the nonattainment area under the Natural Events Policy (NEP).

Exceedances caused by high wind blowing dust storms can occur every year in Doña Ana and Luna Counties. From 2006-2010 the AQB recorded 216 high wind blowing dust PM_{10} NAAQS exceedances on 79 days (Wedding and TEOM data). Averaged over 2006-2010, NMED monitored 43 exceedances on 16 days per year. The most active windblown dust year was 2008, when the AQB monitored 102 exceedances of the 24-hour average on 30 days during the year. 2011 was another active year for high wind and blowing dust as the AQB recorded 88 exceedances on 26 days (Figure A-1). This was 45 more exceedances on 10 more days as compared to the prior five year average.

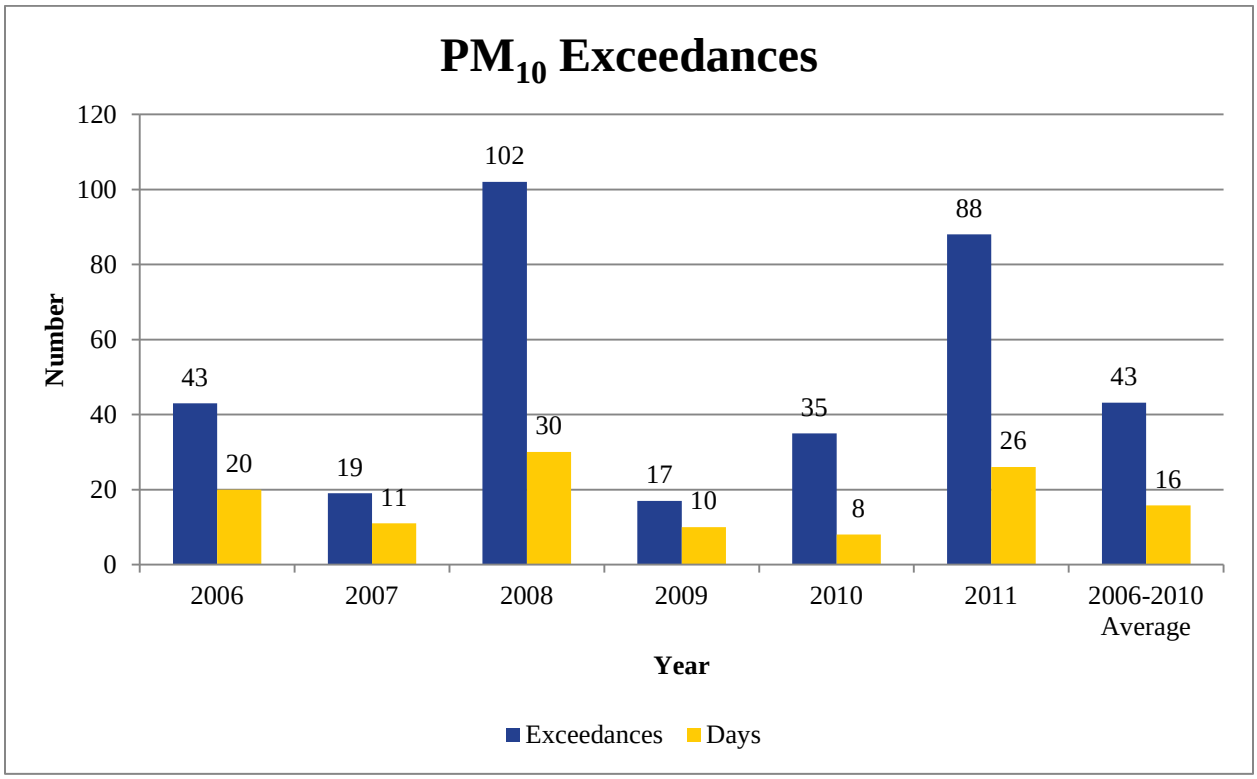


Figure A-1. PM_{10} Exceedances and days with and exceedance by Year from 2006-2011.

The AQB operates two $PM_{2.5}$ FRM Partisol monitors in Doña Ana County. One in Las Cruces on the roof of NMED's field office and one in Sunland Park at the SPCY site. The Las Cruces monitoring site has never recorded an exceedance of the 24-hour $PM_{2.5}$ NAAQS while the SPCY

site recorded 23 exceedances of this standard from 2006-2010. Over this time period, the number of exceedances per year range from none in 2006 to a high of 11 in 2008, with an average of 4.6 exceedances per year. In 2011 the site recorded 14 exceedances, nearly nine more than the five year average (Figure A-2).

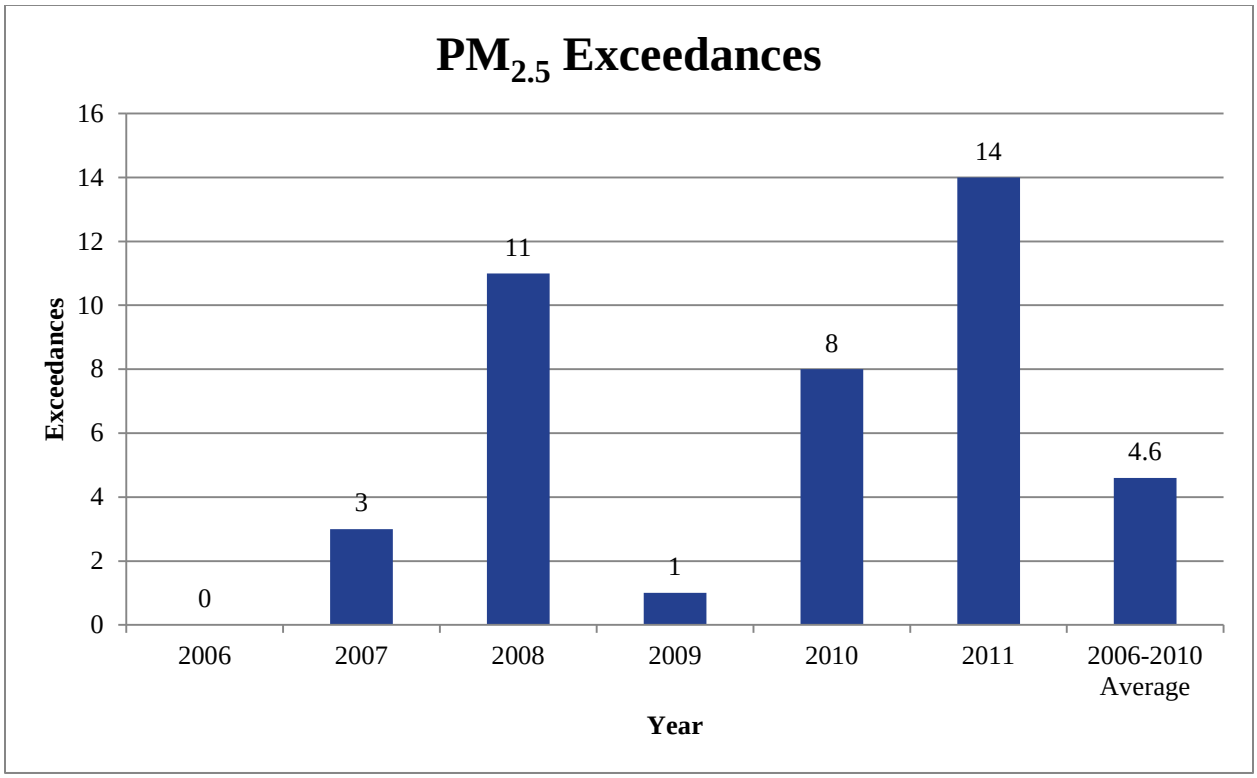


Figure A-2. $PM_{2.5}$ Exceedances and days with and exceedance by Year from 2006-2011.

A.2 Historical Monitoring Site Trends of PM Exceedances

As with the entire network, individual monitoring sites record varied numbers of exceedances from year to year (Figure A-3). From 2006 to 2010 the monitoring sites recorded an average of 2 to 9 exceedances per year. The southern monitoring sites of Anthony, Chaparral, and SPCY recorded the highest number of exceedances on average (approximately 9) while the northern sites of West Mesa and Holman recorded the least amount of exceedances (2 and 5, respectively). The Deming Airport and Desert View monitors did not begin continuous monitoring until after the windy seasons in 2007 and 2008, respectively, so the five year averages for these monitors are skewed downward.

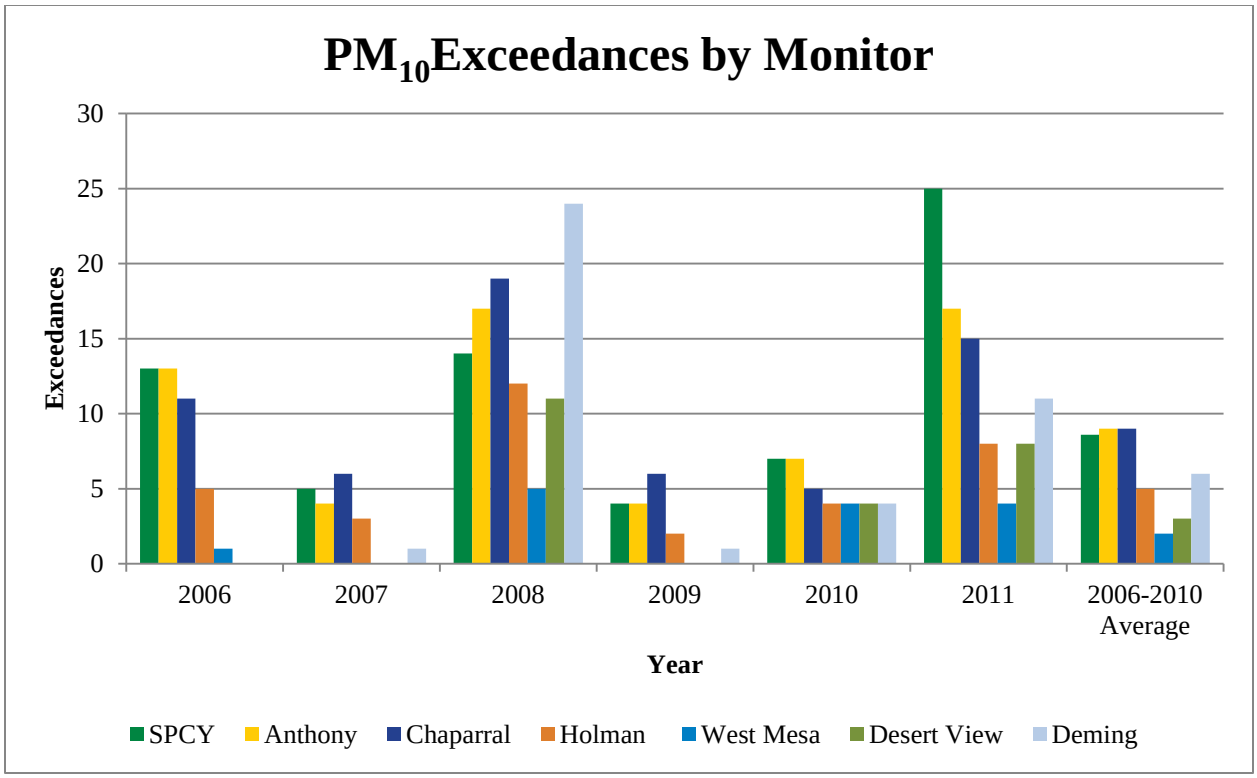


Figure A-3. PM_{10} Exceedances by year and monitor. Data includes FEM TEOM and FRM Wedding for SPCY, Anthony and Deming. The Deming monitors are not collocated. All other sites include FEM TEOM data only.

The Anthony monitoring site records exceedances of the PM_{10} NAAQS every year. From 2006-2010 the FEM TEOM monitor recorded 46 exceedances and the FRM Wedding monitor has recorded 3 exceedances. This large disparity in the number of monitored exceedances is due to the FRM Wedding sampling schedule of 1-in-6 days. Over the same time period this monitoring site recorded an average of 9 exceedances per year.

The Chaparral monitoring site records exceedances of the PM_{10} NAAQS every year. From 2006-2010 the FEM TEOM monitor has recorded 47 exceedances. Over the same time period this monitoring site records an average of 9 exceedances per year.

The Deming Airport monitoring site records exceedances of the PM_{10} NAAQS every year. From 2007-2010 the FEM TEOM monitor has recorded 30 exceedances. The Deming Post Office monitoring site (FRM Wedding) did not record an exceedance during this time period. These monitors are not collocated and operate on different schedules with the airport site operating continuously and the post office site sampling every 6 days. Over the same time period the Deming Airport monitoring site recorded an average of 6 exceedances per year.

The Desert View monitoring site recorded exceedances of the PM_{10} NAAQS two out of four years from 2007-2010. This monitor was deployed in the August of 2007 after the normal windy season. From 2007-2010 the FEM TEOM monitor has recorded 15 exceedances. Over the same time period this monitoring site records an average of 3.75 exceedances per year.

The Holman monitoring site records exceedances of the PM_{10} NAAQS every year. From 2006-2010 the FEM TEOM monitor has recorded 26 exceedances. Over the same time period this monitoring site recorded an average of 5.2 exceedances per year.

The SPCY monitoring site records exceedances of the PM_{10} NAAQS every year. From 2006-2010 the FEM TEOM monitor recorded 42 exceedances and the FRM Wedding monitor has recorded 1 exceedance. This large disparity in the number of monitored exceedances is due to the FRM Wedding sampling schedule of 1-in-6 days. Over the same time period this monitoring site records an average of 8.6 exceedances per year.

The West Mesa monitoring site recorded exceedances of the PM_{10} NAAQS three out of five years from 2006-2010. From 2006-2010 the FEM TEOM monitor has recorded 10 exceedances. Over the same time period this monitoring site recorded an average of 2 exceedances per year.

The SPCY monitoring site recorded exceedances of the 24-hour $PM_{2.5}$ NAAQS four out of five years from 2006-2010. These exceedances occur during high wind and blowing dust conditions and also on calm and stagnant days. From 2006-2010 the SPCY monitor recorded 23 exceedances with 7 during high wind conditions and 16 during low wind conditions (Figure A-4). The AQB deployed a saturation network during the winter and early spring months of 2008 to 2009 to investigate where the pollution originated. The results of the study indicated that a source area located 2-4 km south of the SPCY monitor in Cd. Juárez contributed to elevated levels of pollution (DuBois, 2009). Earlier studies concluded that the dominate component of the particulate matter consisted of crustal material most likely from dirt roads and fuel combustion. The rapid growth and development of Colonia Anapra (northwest Cd. Juárez) along the border in Mexico continues to contribute to these observed elevated levels.

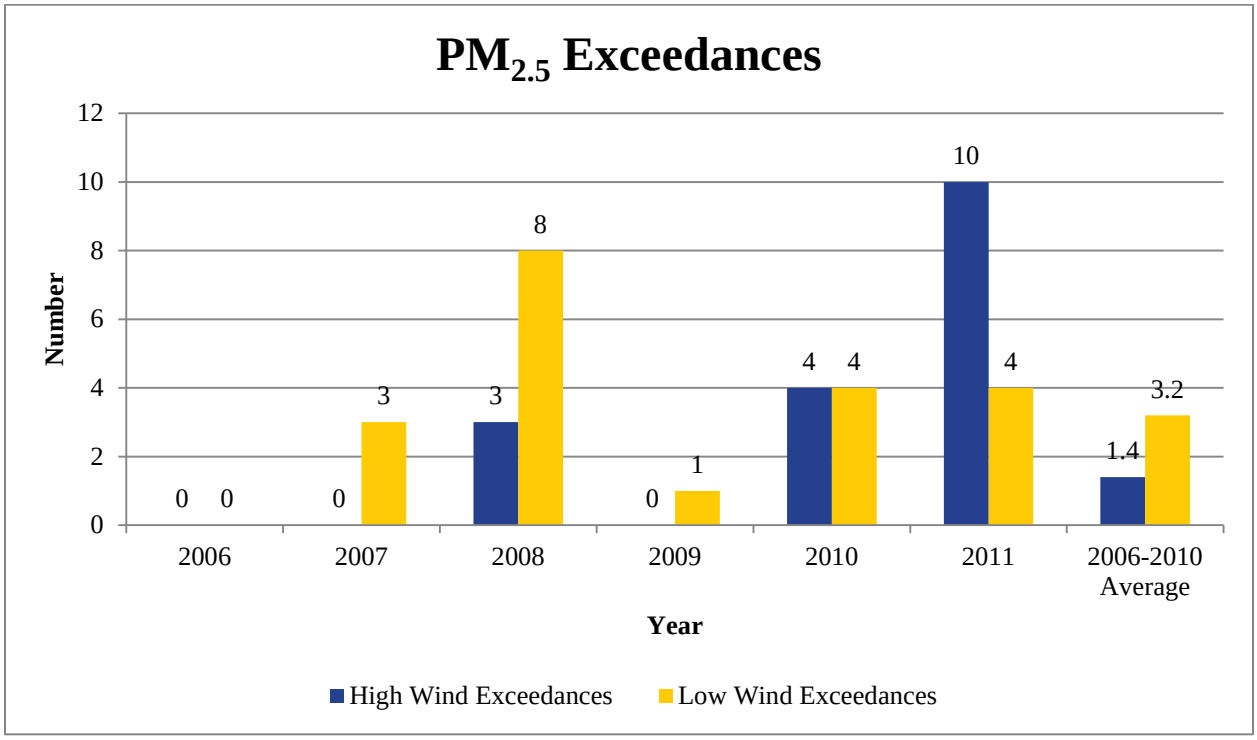


Figure A-4. $PM_{2.5}$ exceedances due to high winds and international transport from 2006-2011.

Appendix B

Historical Fluctuations

B.1 Background Concentrations and Historical Fluctuations

To establish normal historical fluctuations and background concentrations, the AQB conducted statistical analyses of 24-hour average PM_{10} concentrations, hourly PM_{10} concentrations, average hourly wind gust and speeds, as well as hourly PM_{10} and $PM_{2.5}$ distributions (See appendices C-E) for suspected high wind blowing dust events for the five years preceding 2011 (2006-2010 when available). As used here normal historical fluctuations and background concentrations of PM_{10} and $PM_{2.5}$ means days that did not have suspected natural events from 2006-2010. Suspected natural events are those days for which NMED submitted documentation and analysis to EPA under the NEAP or EER.

Table B-1 shows that 99% percent of 24-hour average PM_{10} monitored concentrations in Doña Ana County fell below the corresponding NAAQS of 150 µg/m^3. For most monitoring sites, the measured concentrations fall well below this level. The only monitoring site that records 1% of days with concentrations approaching the $PM_{2.5}$ 24-hour standard is at SPCY. NMED suspects that unpaved roads and fuel combustion in Ciudad Juárez, Mexico cause these elevated levels (Claiborn et al., 2000; DuBois et al., 2009; Li et al., 2005). Table B-2 includes exceptional events caused by high wind and blowing dust and shows that 5% of days exceed the PM_{10} and $PM_{2.5}$ 24-hour standards.

Statistic/Site	Anthony	Chaparral	Deming	Desert View	Holman	SPCY	West Mesa	SPCY $PM_{2.5}$
Max	146	149	152	150	153	154	153	52
99th Percentile	125	116	90	116	108	129	76	35.4
95th Percentile	90	69	54	76	61	101	43	24.7
75th Percentile	57	35	29	44	32	57	22	12.8
50th Percentile	40	23	19	31	21	40	15	8.9
Mean	44	28	23	35	26	45	18	10.6
25th Percentile	26	15	12	20	14	24	10	6.1
5th Percentile	14	7	6	9	6	12	6	3.5

Table B-1. 24-hour average data distribution excluding high wind exceptional events for southern New Mexico monitors from 2006-2010.

Statistic/Site	Anthony	Chaparral	Deming	Desert View	Holman	SPCY	West Mesa	SPCY $PM_{2.5}$
Max	775	604	1033	420	542	555	416	55.3
99th Percentile	230	255	251	178	179	223	100	37.1
95th Percentile	103	91	65	83	68	116	44	25.4
75th Percentile	59	36	29	45	33	59	22	12.9
50th Percentile	41	23	19	31	22	40	15	8.9
Mean	49	34	29	38	29	49	19	10.8
25th Percentile	27	15	12	20	14	25	10	6.1
5th Percentile	14	7	6	9	6	12	6	3.5

Table B-2. 24-hour average data distribution for southern New Mexico monitors from 2006-2010.

Figure B-1 shows that the exceedances recorded in 2011 are well above background levels. NMED downloaded the data from EPA's AQS Data Mart. Data is from 2006-2010 except for Desert View (2007-10). The top whisker in Figure B-1 represents the 95th percentile of data with the upper dash representing the 99th percentile of data.

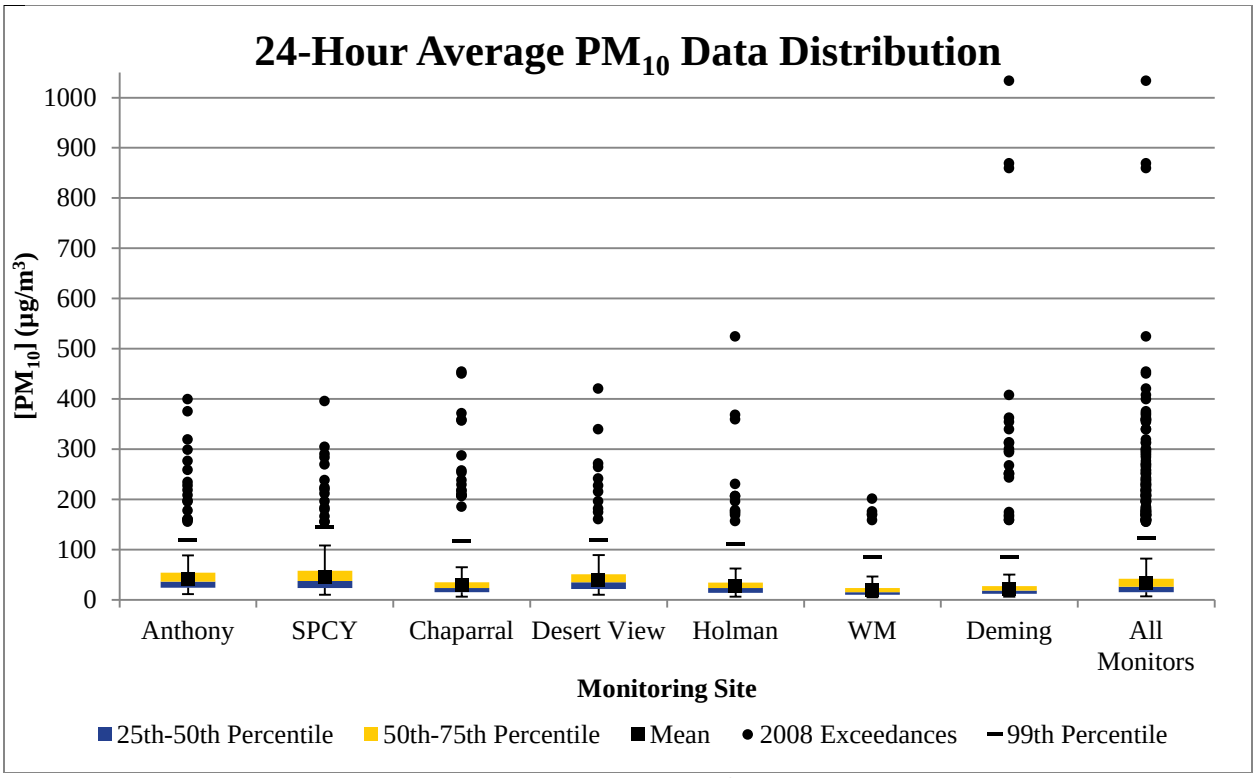


Figure B-1. PM_{10} exceedances in 2011 plotted with historical data distributions for 2006-2010.

Although the overall seasonal trend shows spring as the predominant season in which exceedances occur, the amount of precipitation from year to year can influence this seasonal trend and overall number of exceedances. The overall trend shows that spring events are most prominent followed by winter and summer then fall. Fall through spring events occur due to frontal weather systems while summer time events occur when monsoonal thunderstorms produce strong outflow winds and localized blowing dust (Figure B-2). When the monsoon season (June-September) and winter (December-February) produce large amounts of precipitation, we can see a marked decrease in springtime and annual events as observed in 2007 and 2009 following the heavy rainfall during the 2006 and 2009 monsoon (Figure B-3).

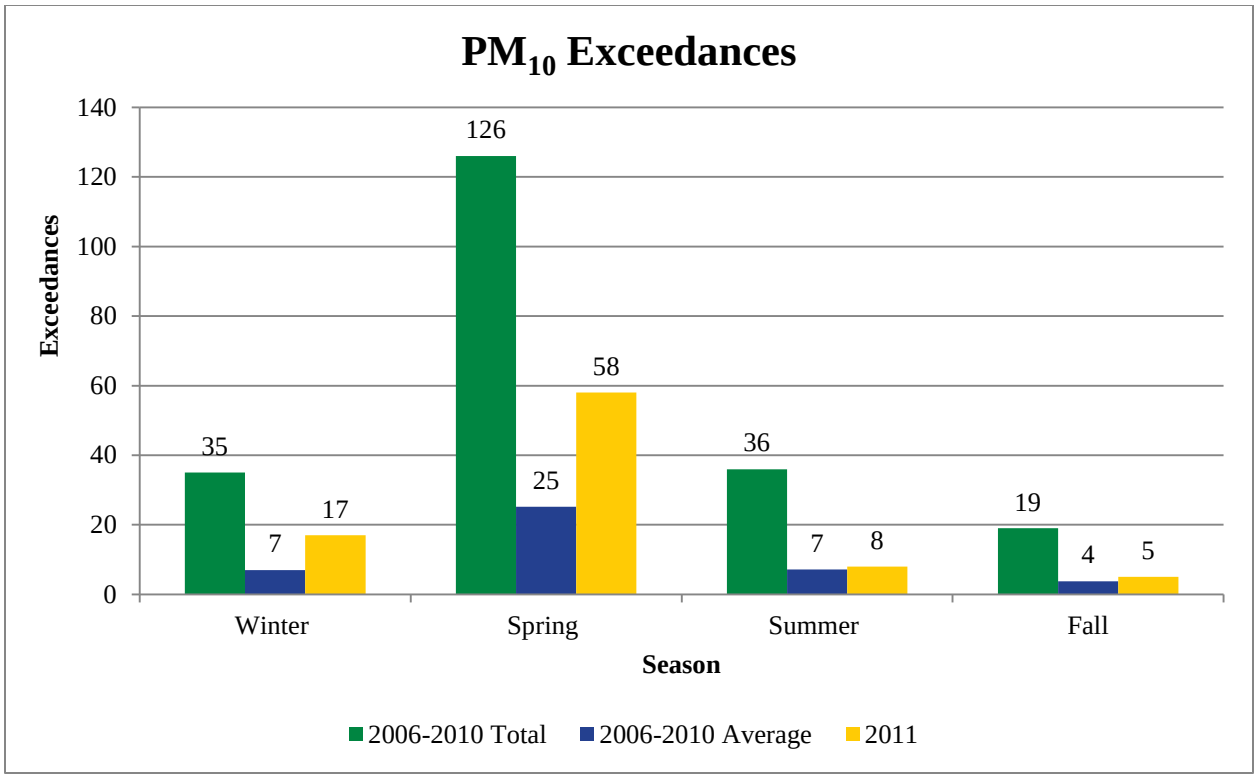


Figure B-2. 24-Hour PM_{10} Exceedances in southern New Mexico from 2006-11.

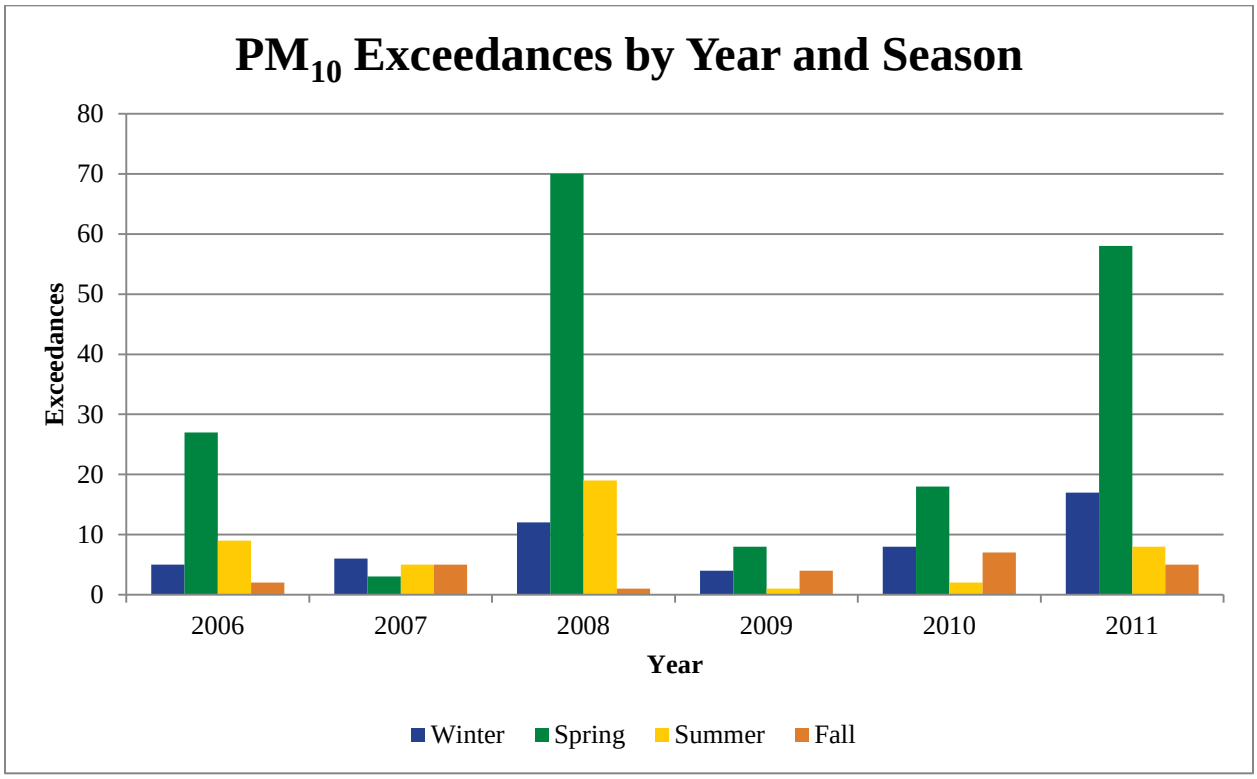


Figure B-3. PM_{10} by exceedances by season and year 2006-11.

Since being established, most monitoring sites in Doña Ana and Luna Counties record exceedances of the PM_{10} 24-hour standard every year. High winds cause these exceedances and they can occur at any time of year (Figure B-4 through B-11). Most exceedances occur from late winter through early summer (February-June) and are associated with the passage of Pacific cold fronts. The only monitoring site to record exceedances when winds are calm is the SPCY site ($PM_{2.5}$ Partisol Monitor). From 2006 to 2010, NMED recorded 16 low wind $PM_{2.5}$ 24-hour exceedances at SPCY. EPA lowered the $PM_{2.5}$ 24-hour NAAQS from 65 to 35 µg/m^3 in August 2006 and NMED did not record any exceedances prior to this date. In 2009, NMED set up a saturation network to investigate the cause of these exceedances. The results of this study indicate that the source of $PM_{2.5}$ came from international transport from Ciudad Juárez, Mexico (DuBois et al, 2009). The maximum 24-hour average PM_{10} concentration recorded by NMED was 1110 µg/m^3 recorded in 2004 at the Chaparral site. High winds caused all recorded exceedances at all sites except SPCY and NMED submitted natural events demonstrations to EPA under the NEAP or EER for these events. NMED has never recorded an exceedance at its monitors in the absence of high winds except for at SPCY.

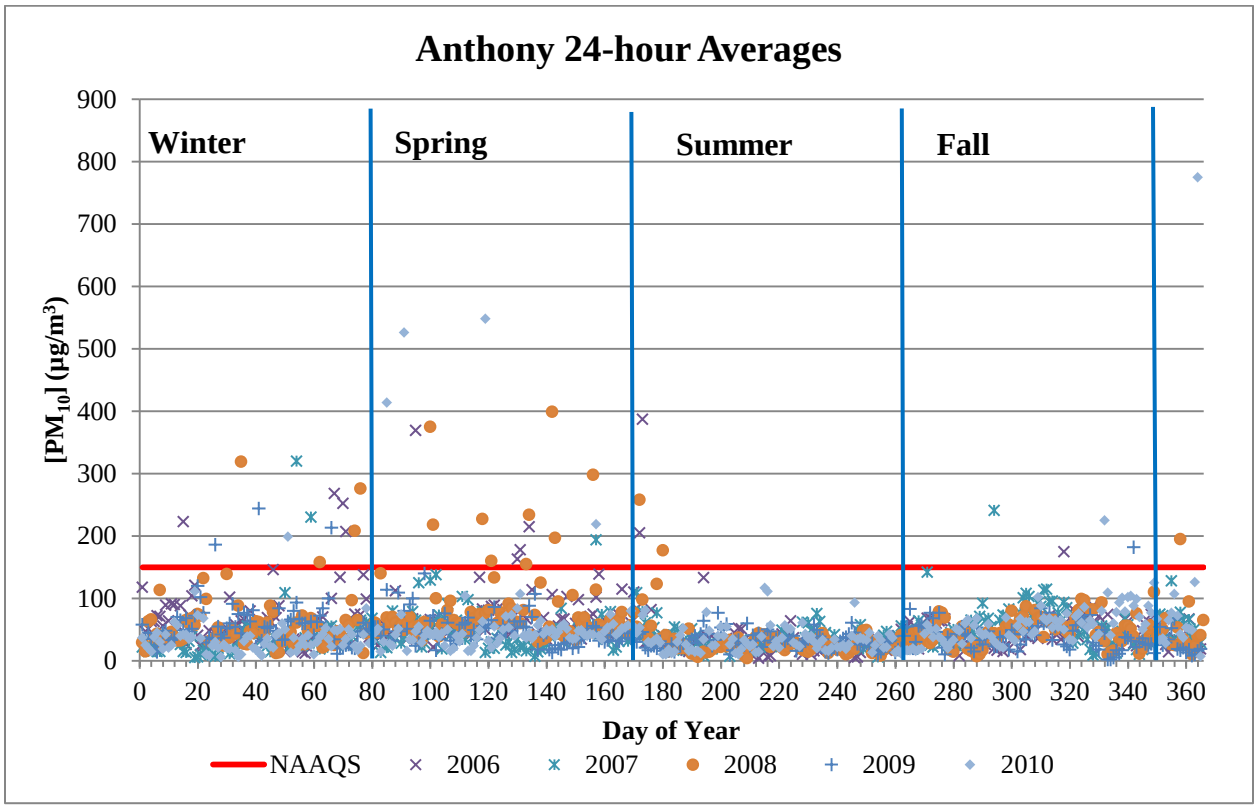


Figure B-4. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2006-2010

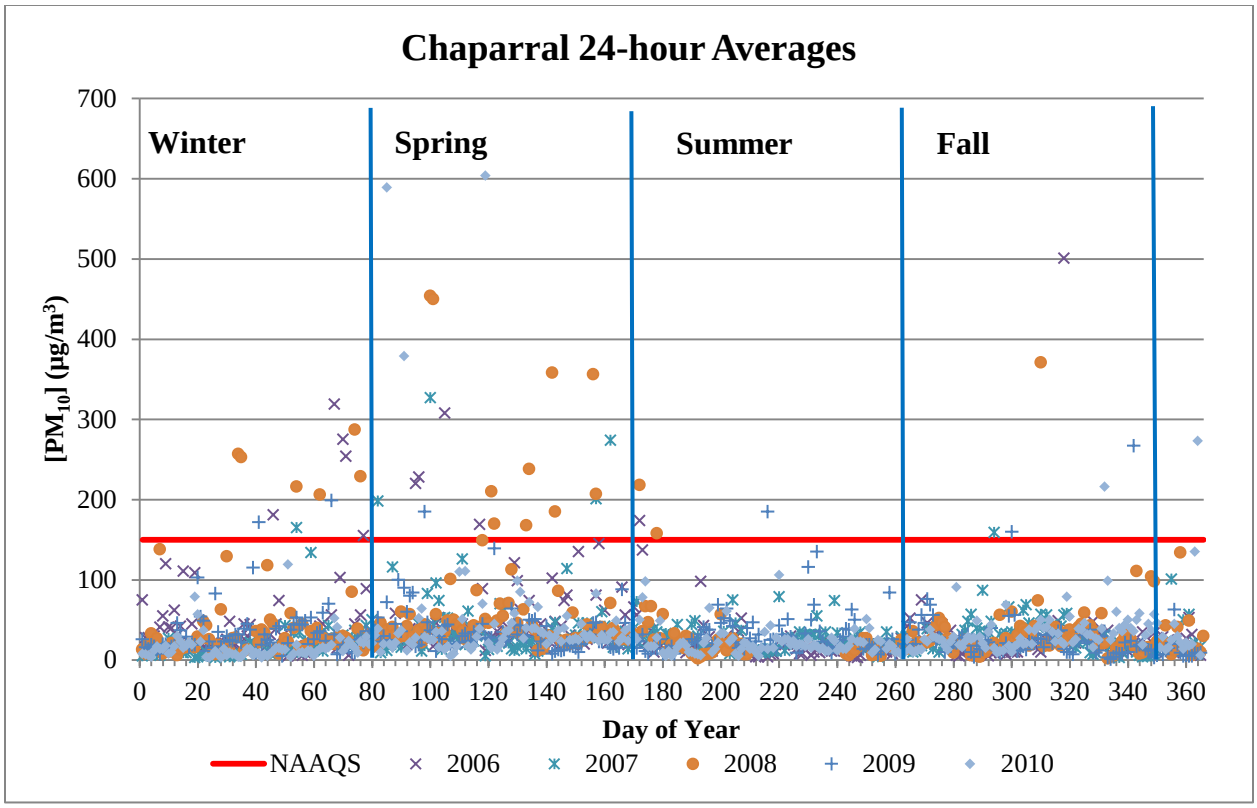


Figure B-5. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2006-2010

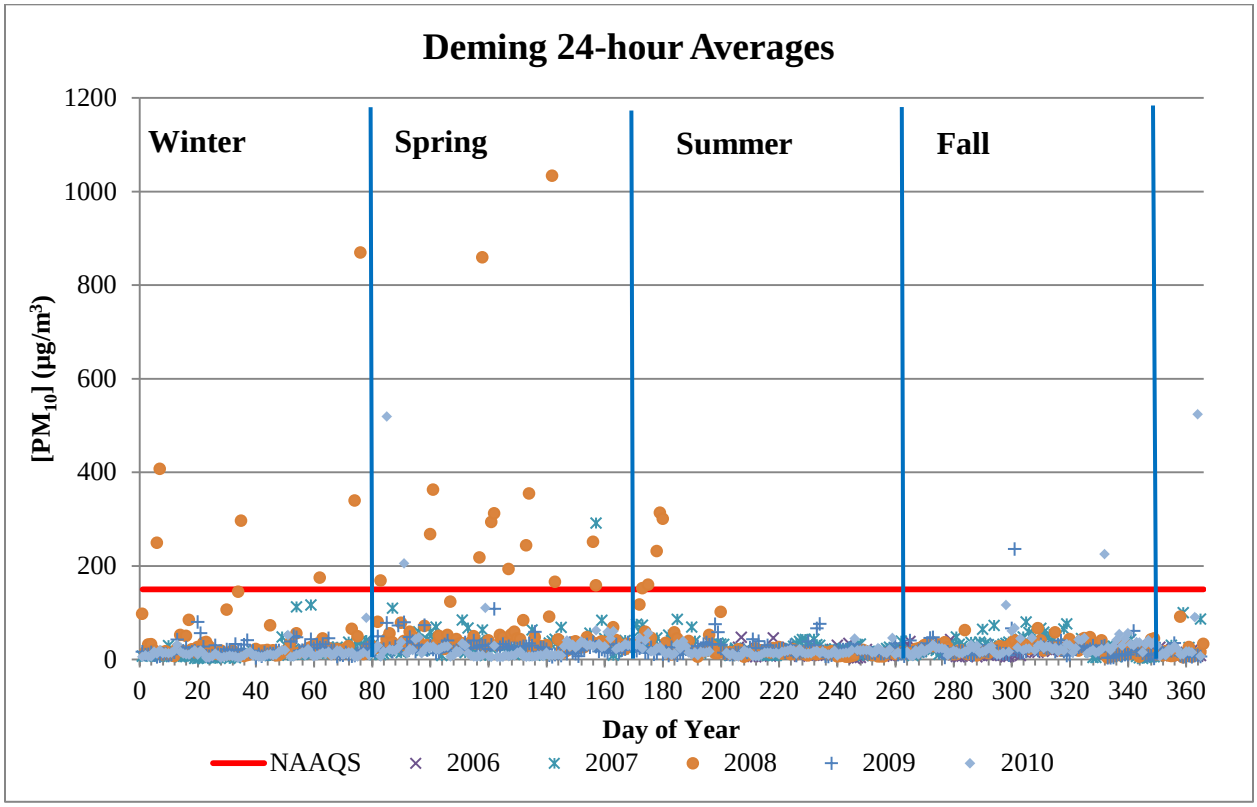


Figure B-6. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2006-2010

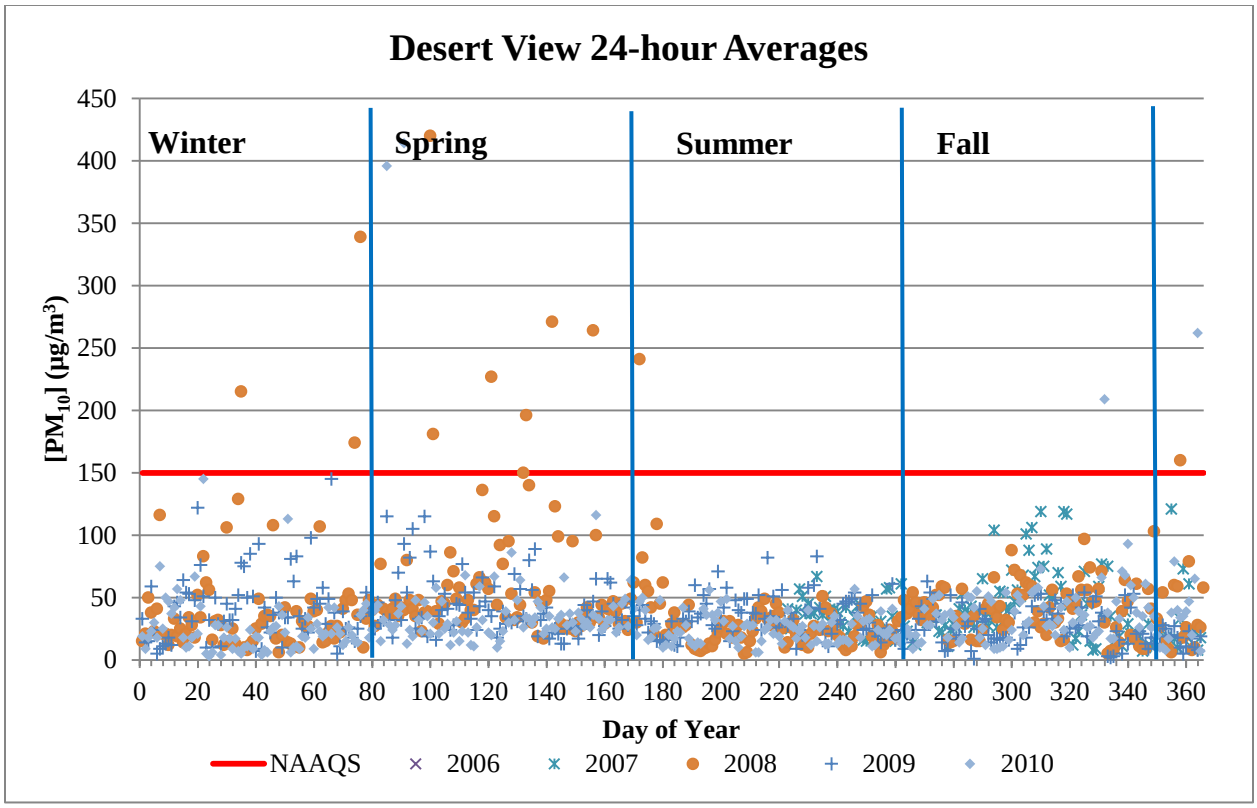


Figure B-7. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2007-2010

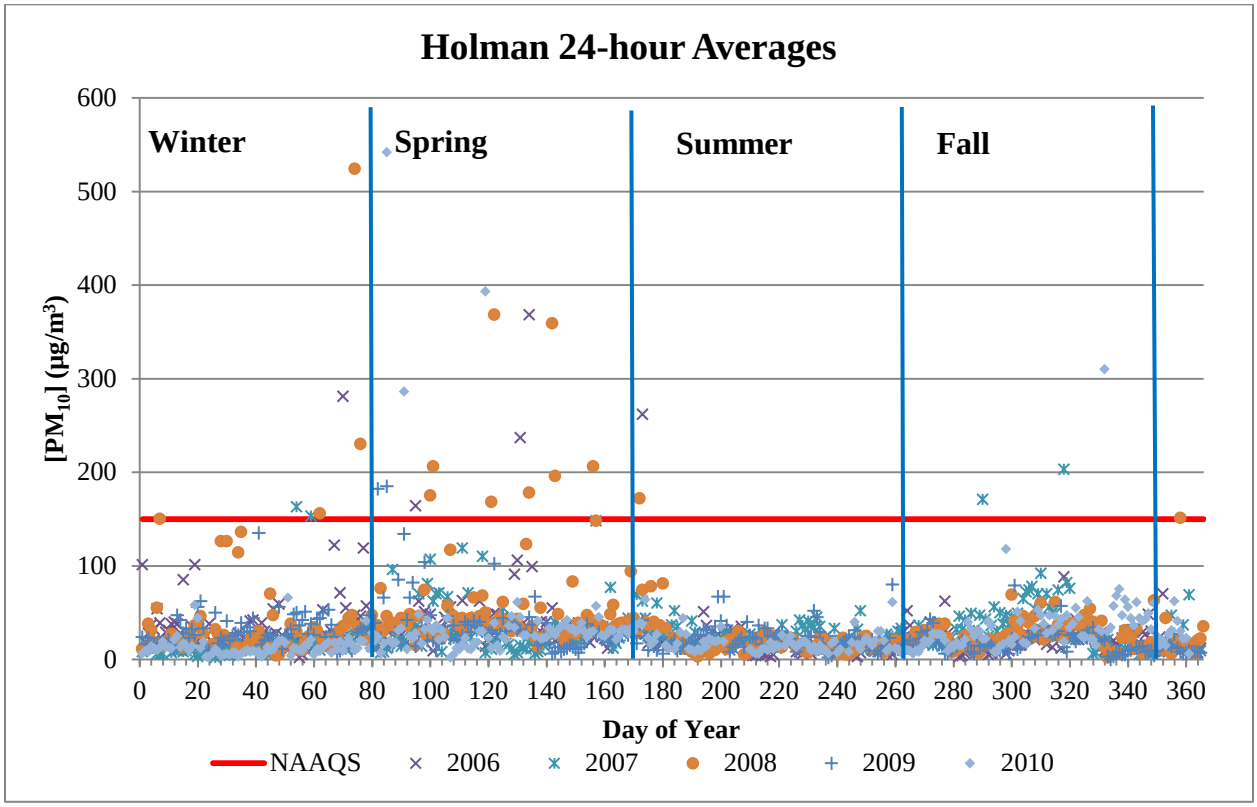


Figure B-8. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2006-2010

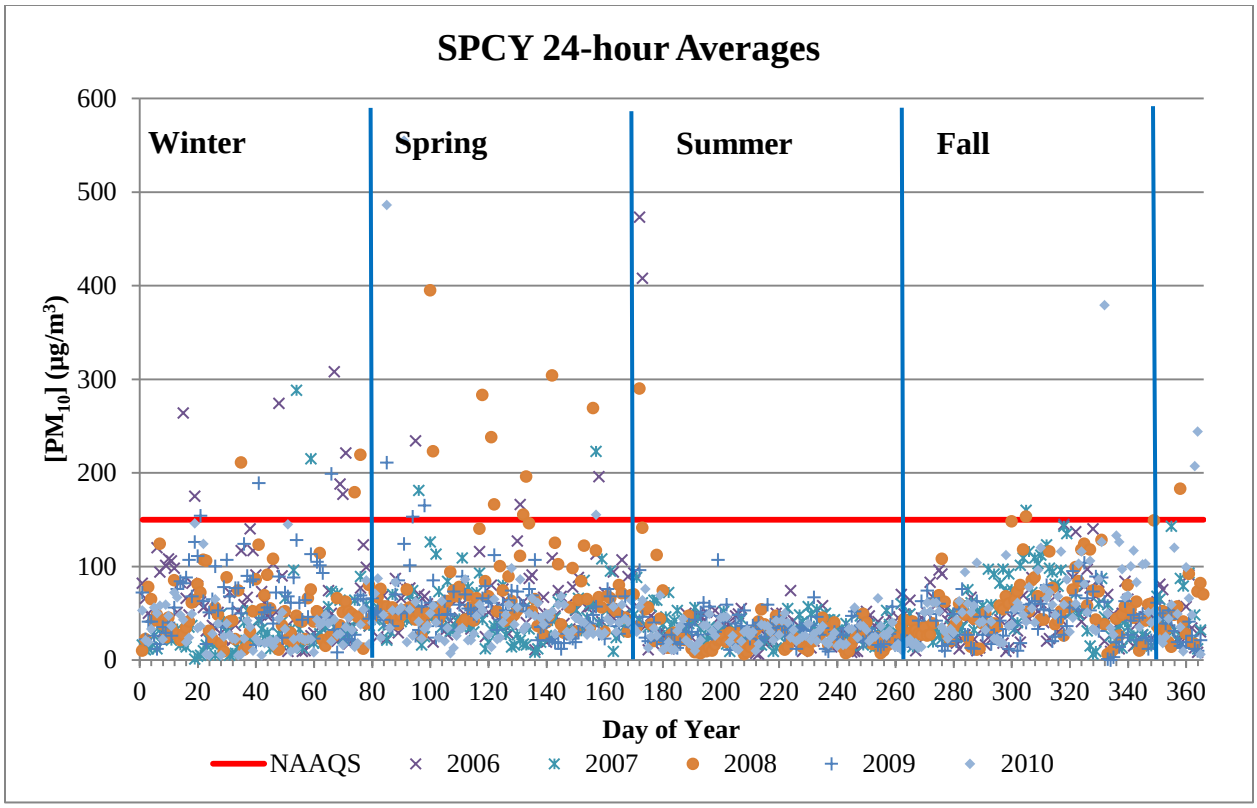


Figure B-9. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2006-2010

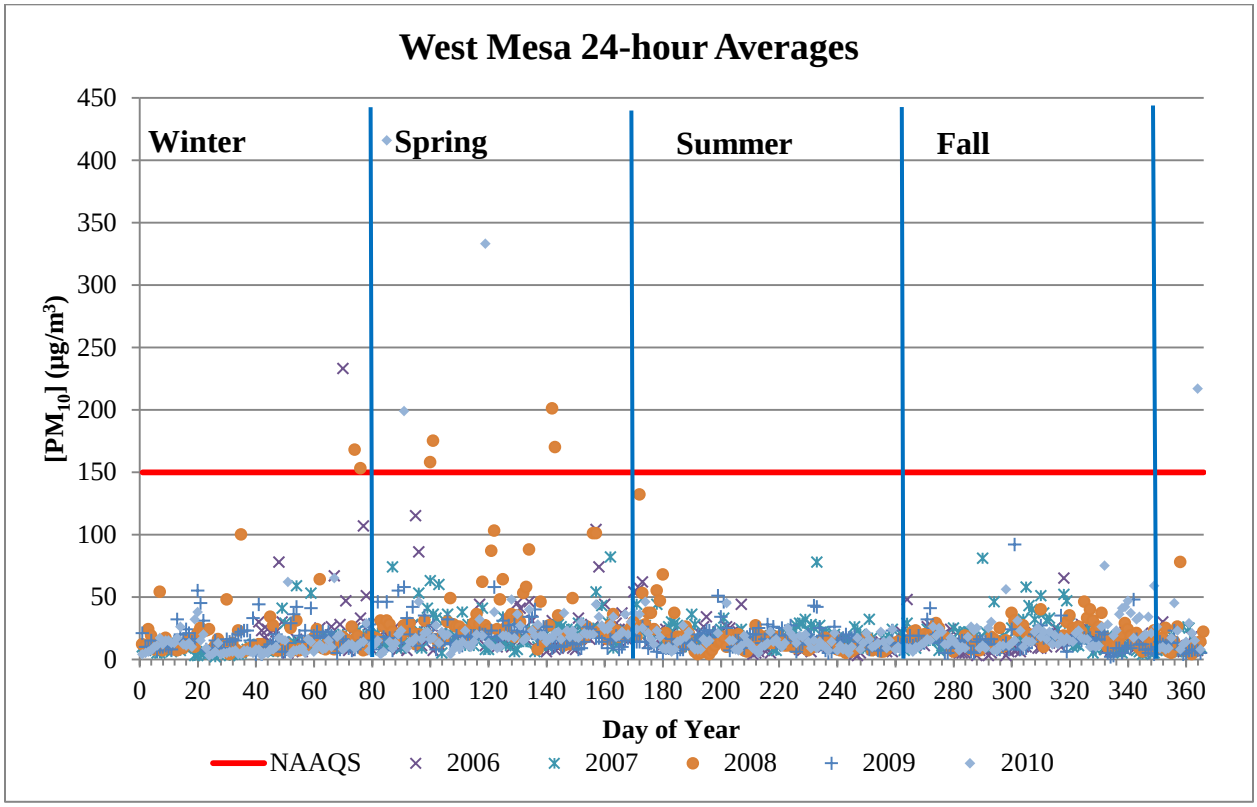


Figure B-10. 24-hour average PM_{10} concentrations (FEM TEOM data) by day of year from 2006-2010

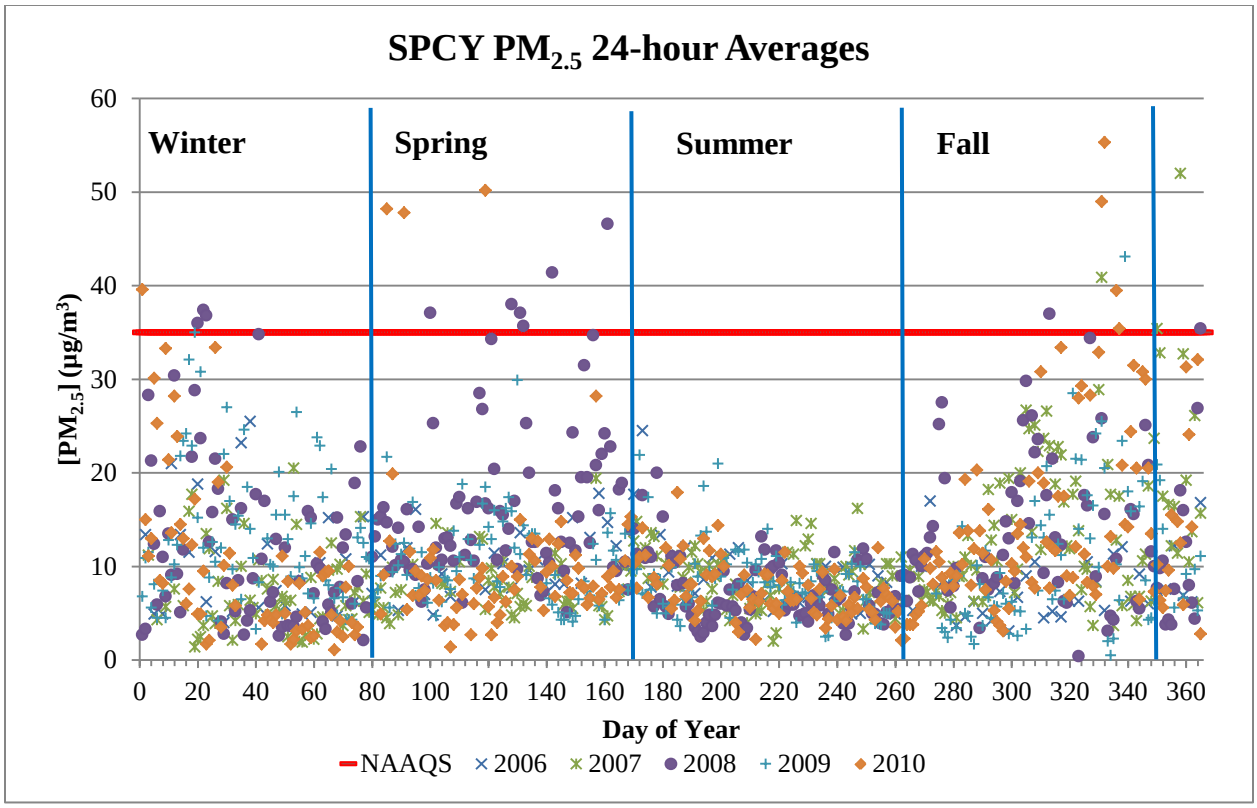


Figure B-11. 24-hour average $PM_{2.5}$ concentrations (FRM Partisol data) by day of year from 2006-2010

Appendix C

Hourly Particulate Matter Fluctuations

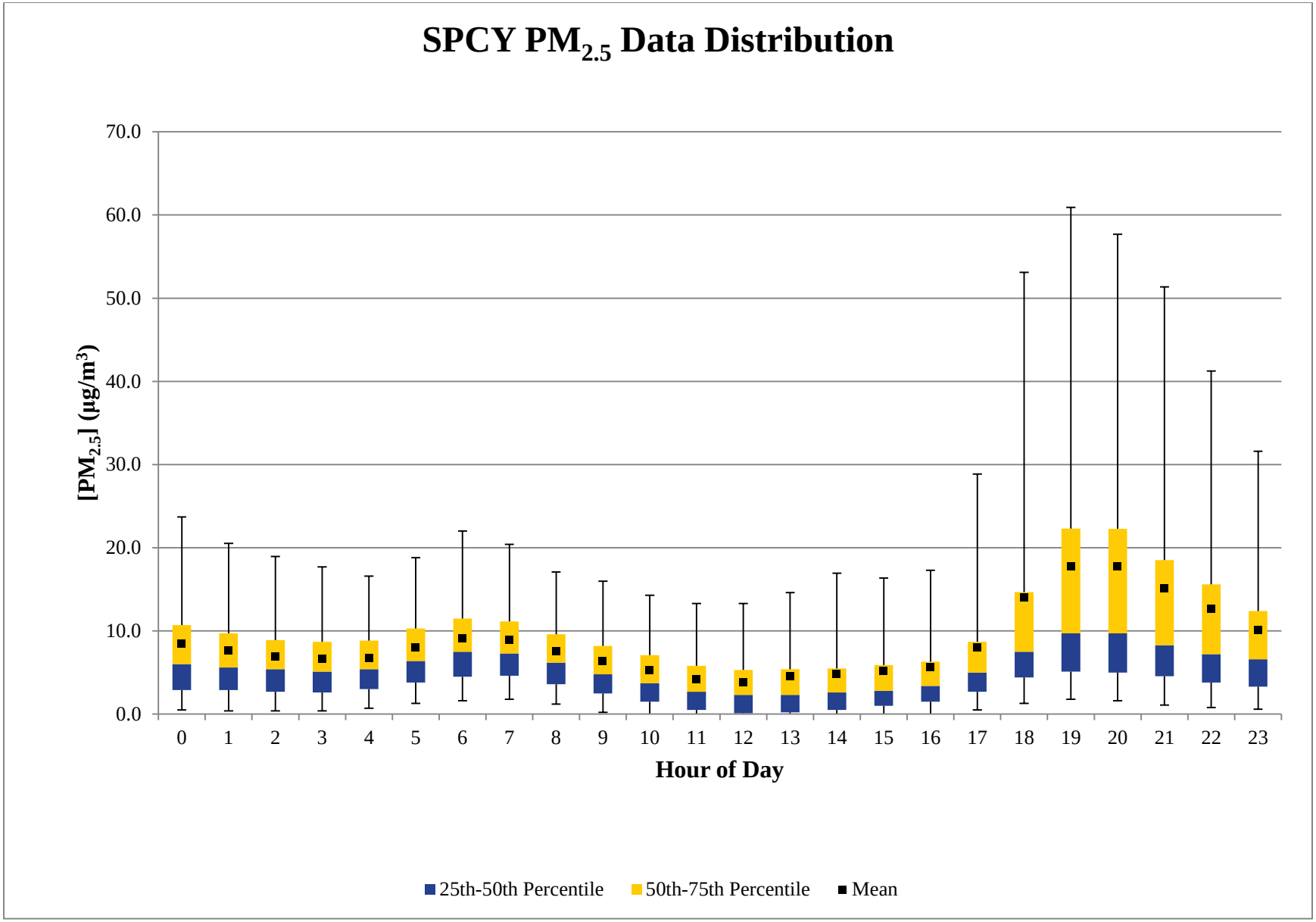


Figure C-1. $PM_{2.5}$ data distribution from 2006-2010 for all data.

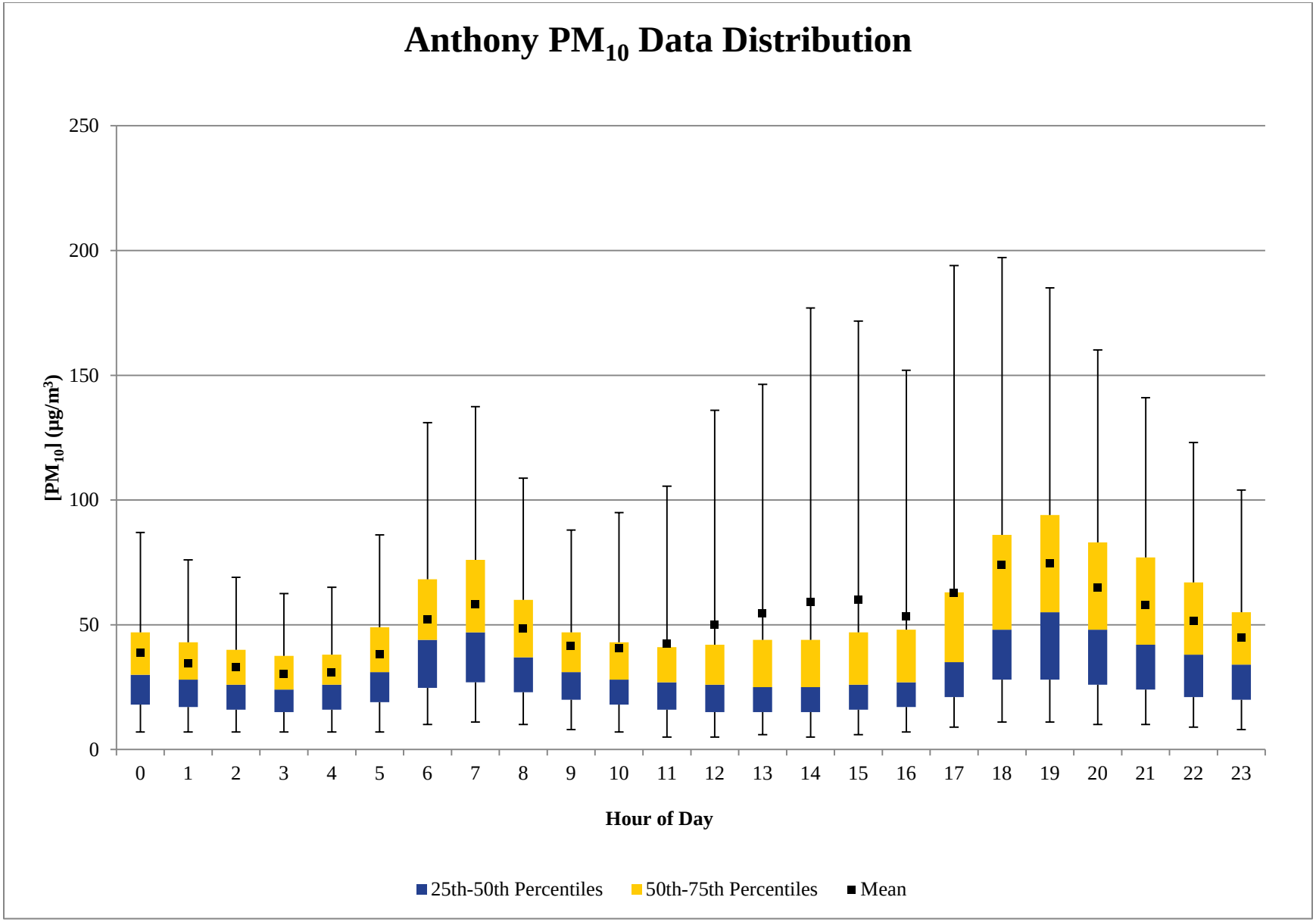


Figure C-2. PM_{10} data distribution from 2006-2010 for all data

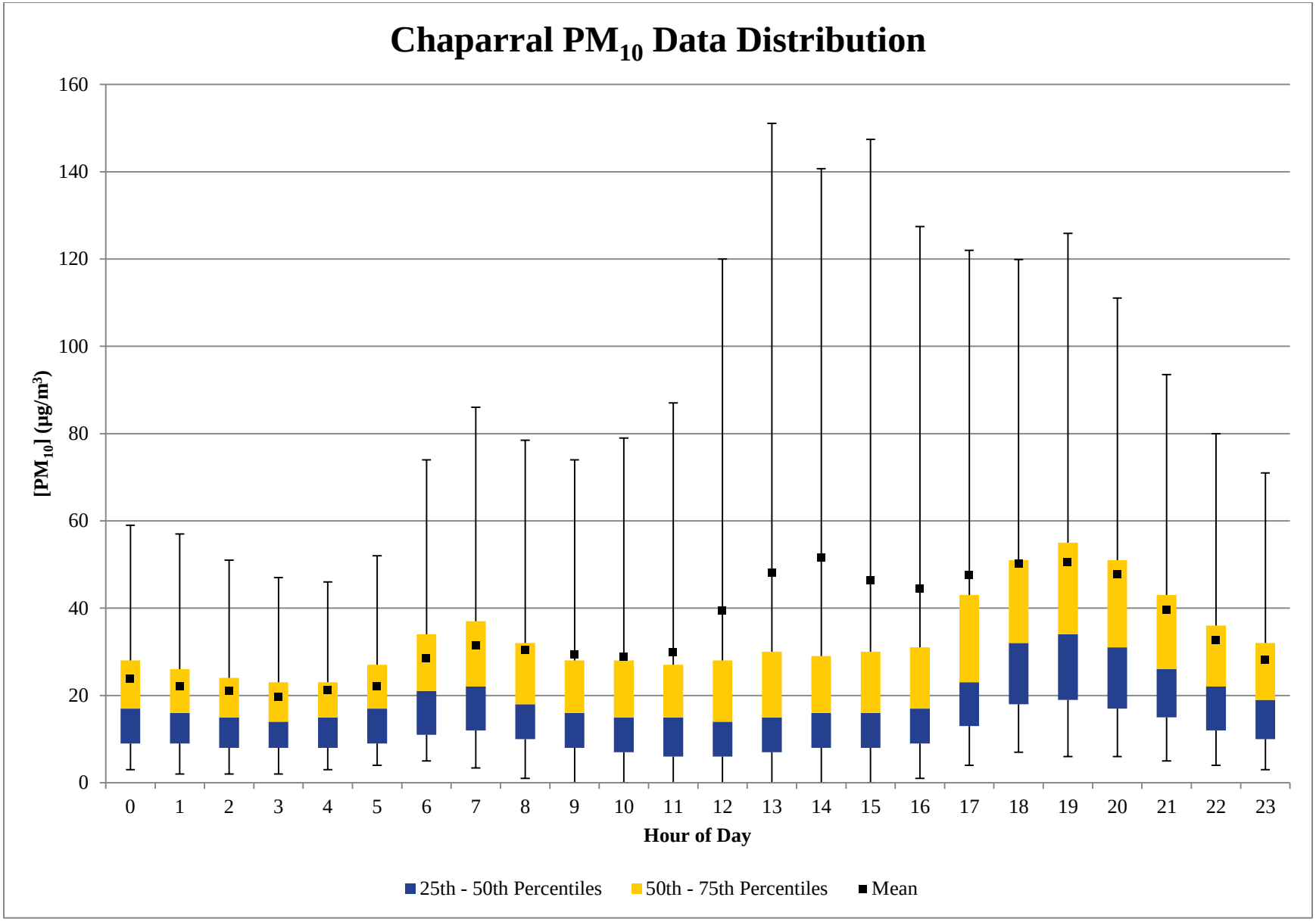


Figure C-3. PM_{10} data distribution from 2006-2010 for all data

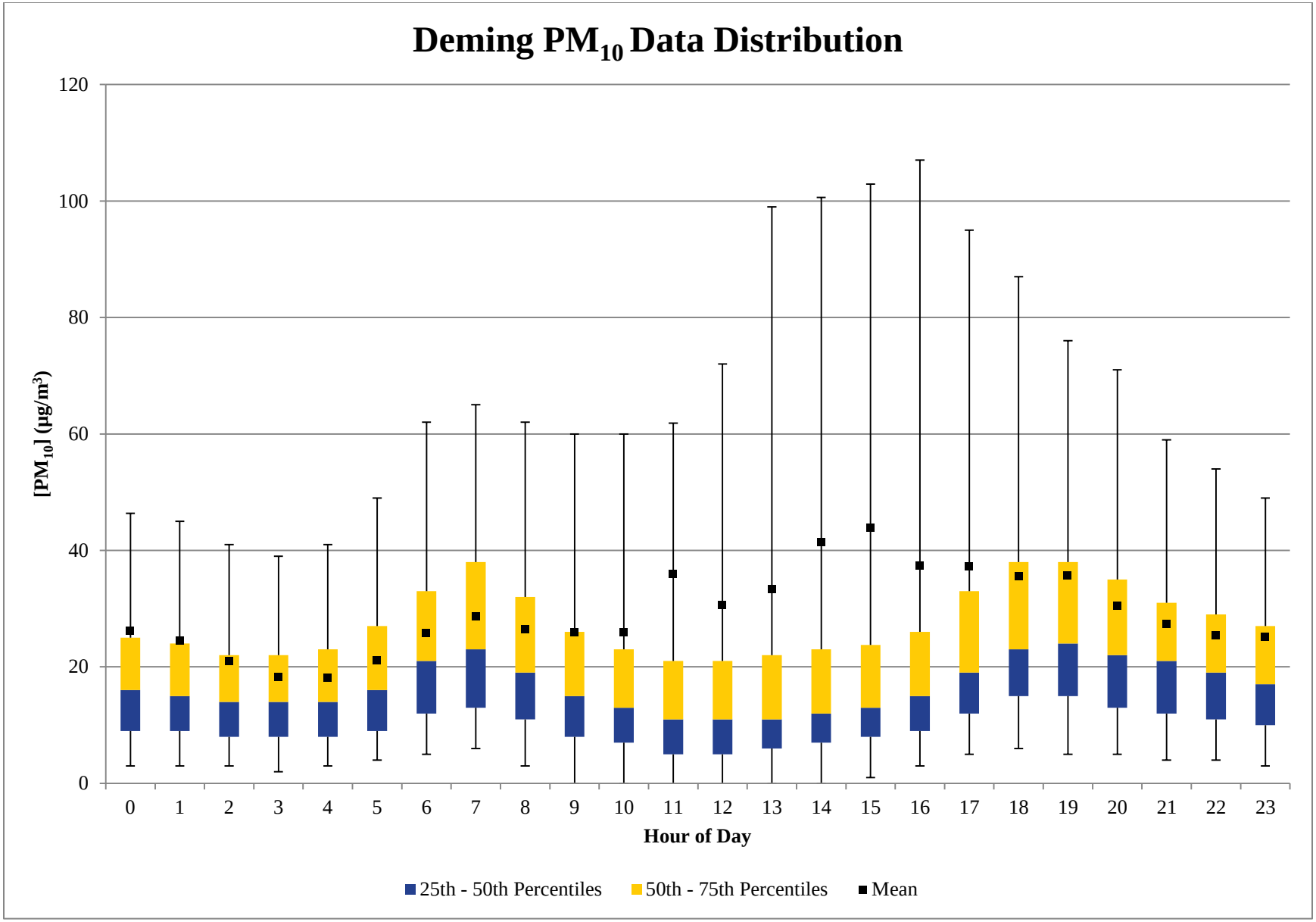


Figure C-4. PM_{10} data distribution from 2006-2010 for all data

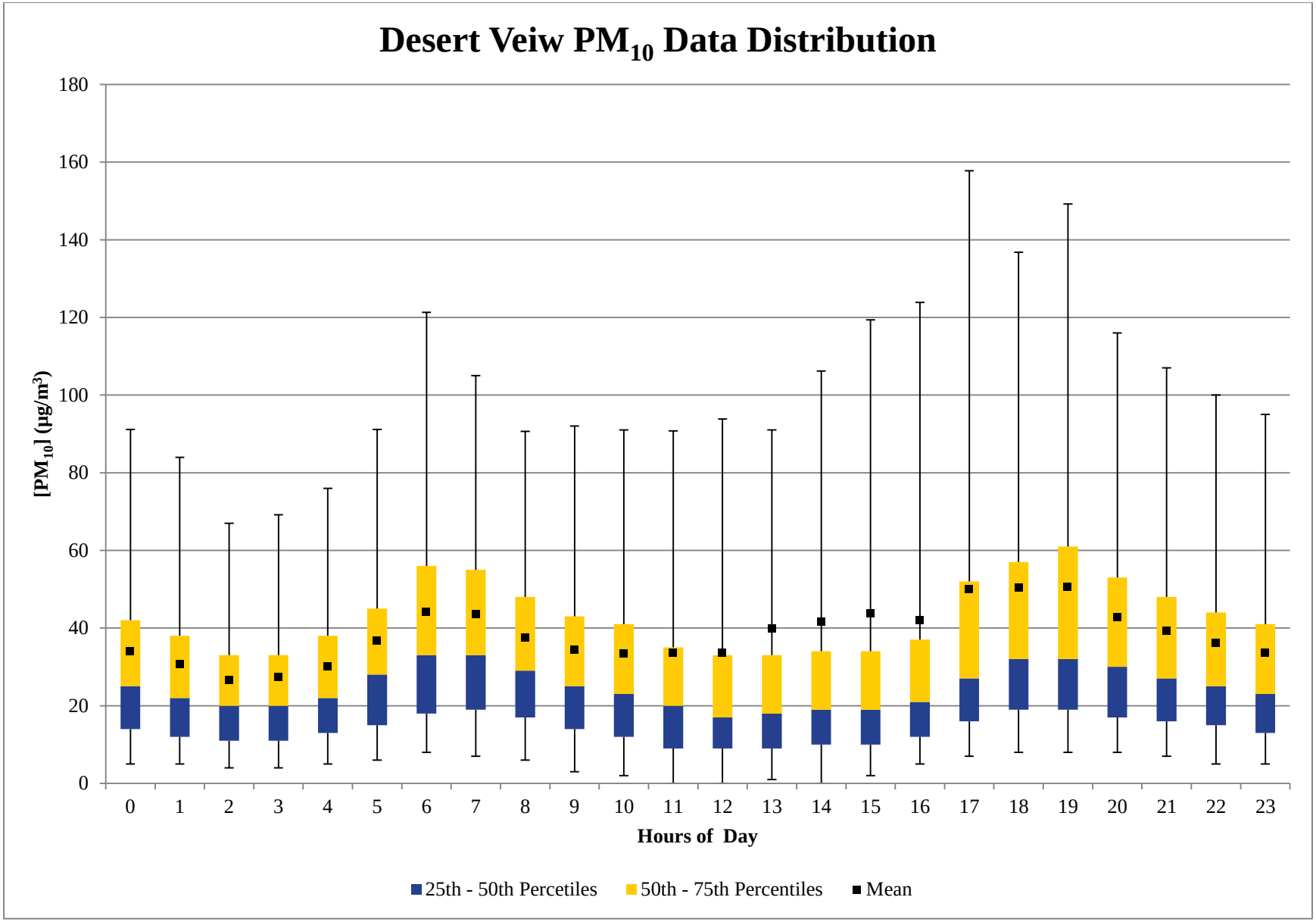


Figure C-5. PM_{10} data distribution from 2007-2010 for all data

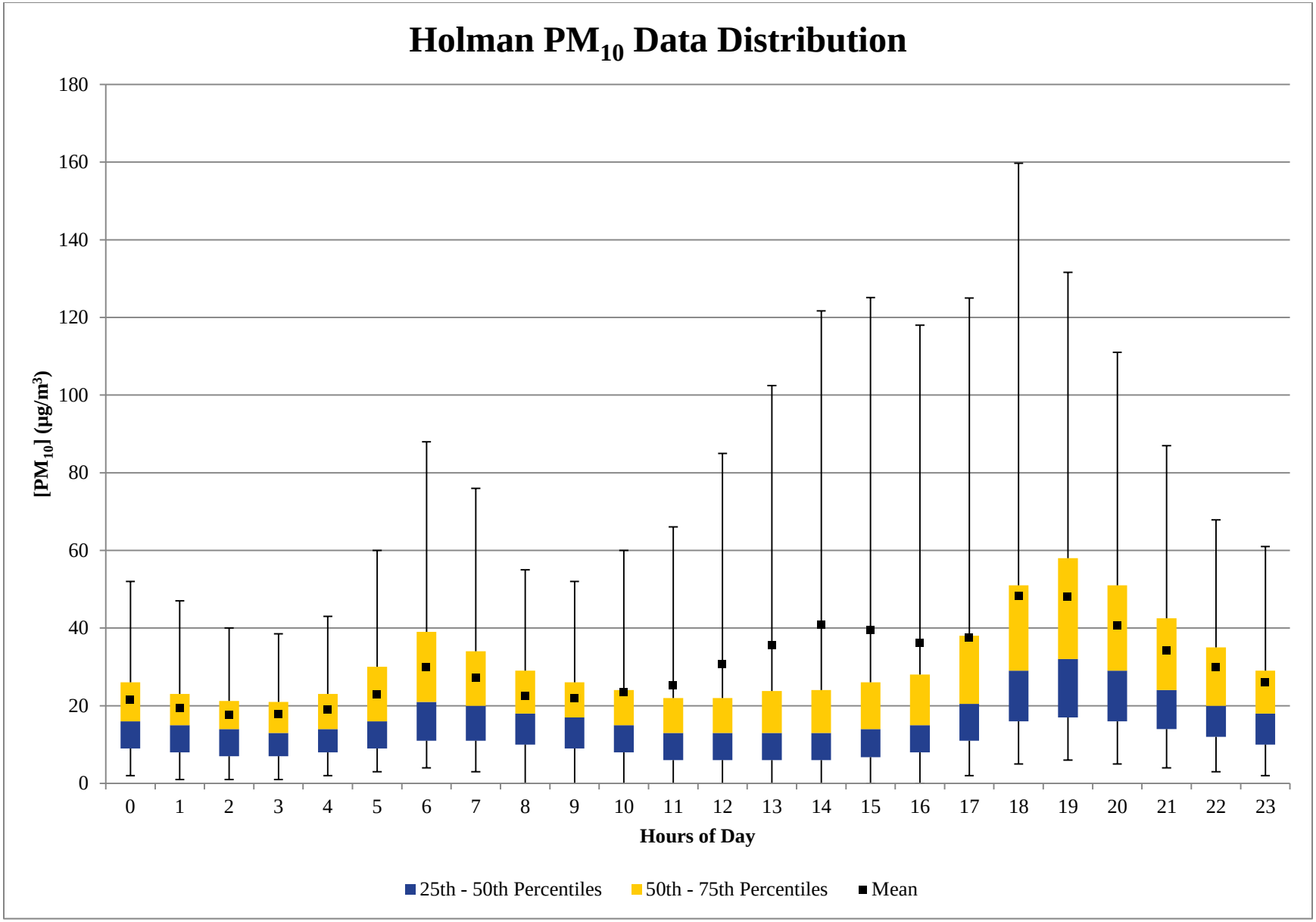


Figure C-6. PM_{10} data distribution from 2006-2010 for all data

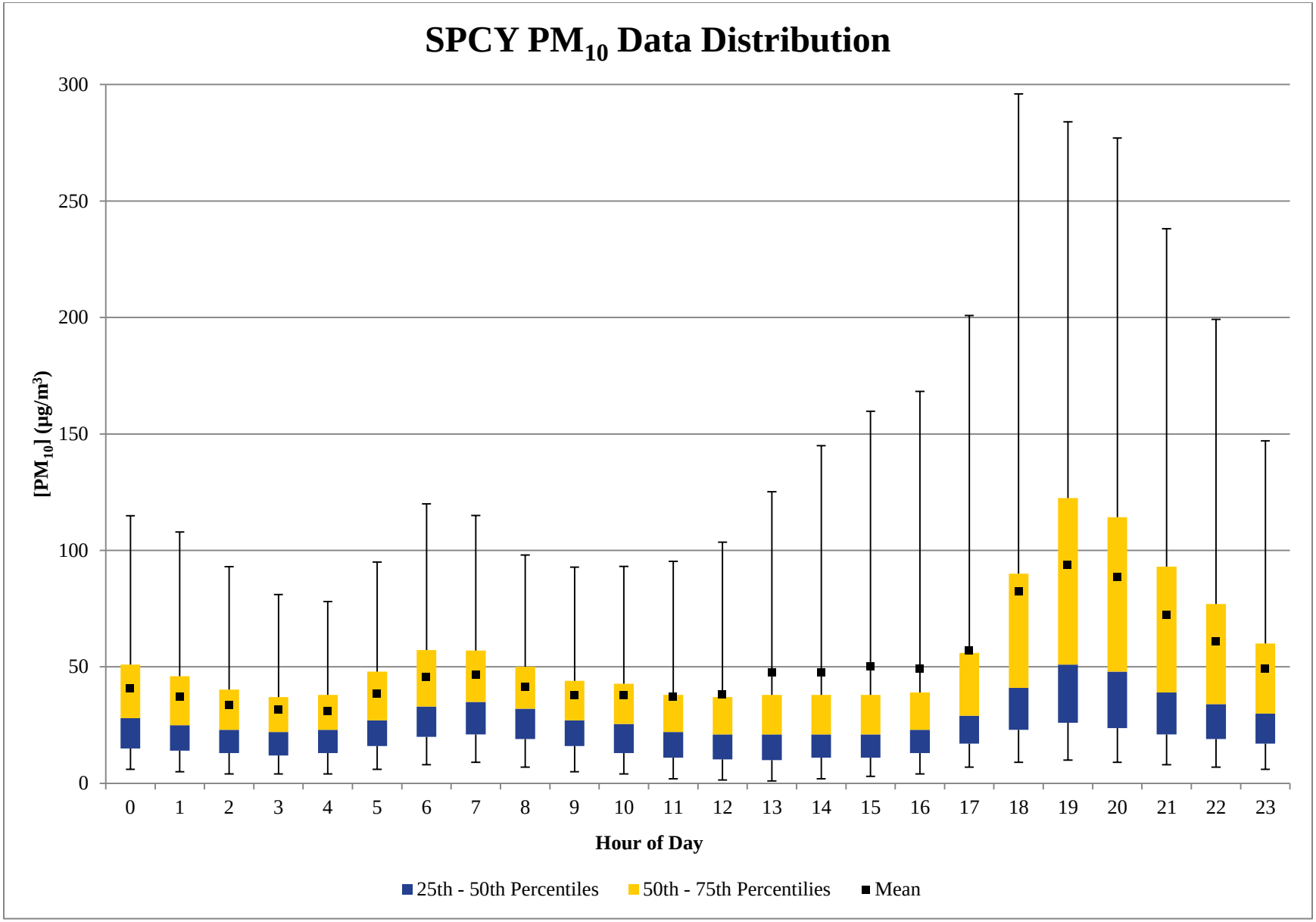


Figure C-7. PM_{10} data distribution from 2006-2010 for all data

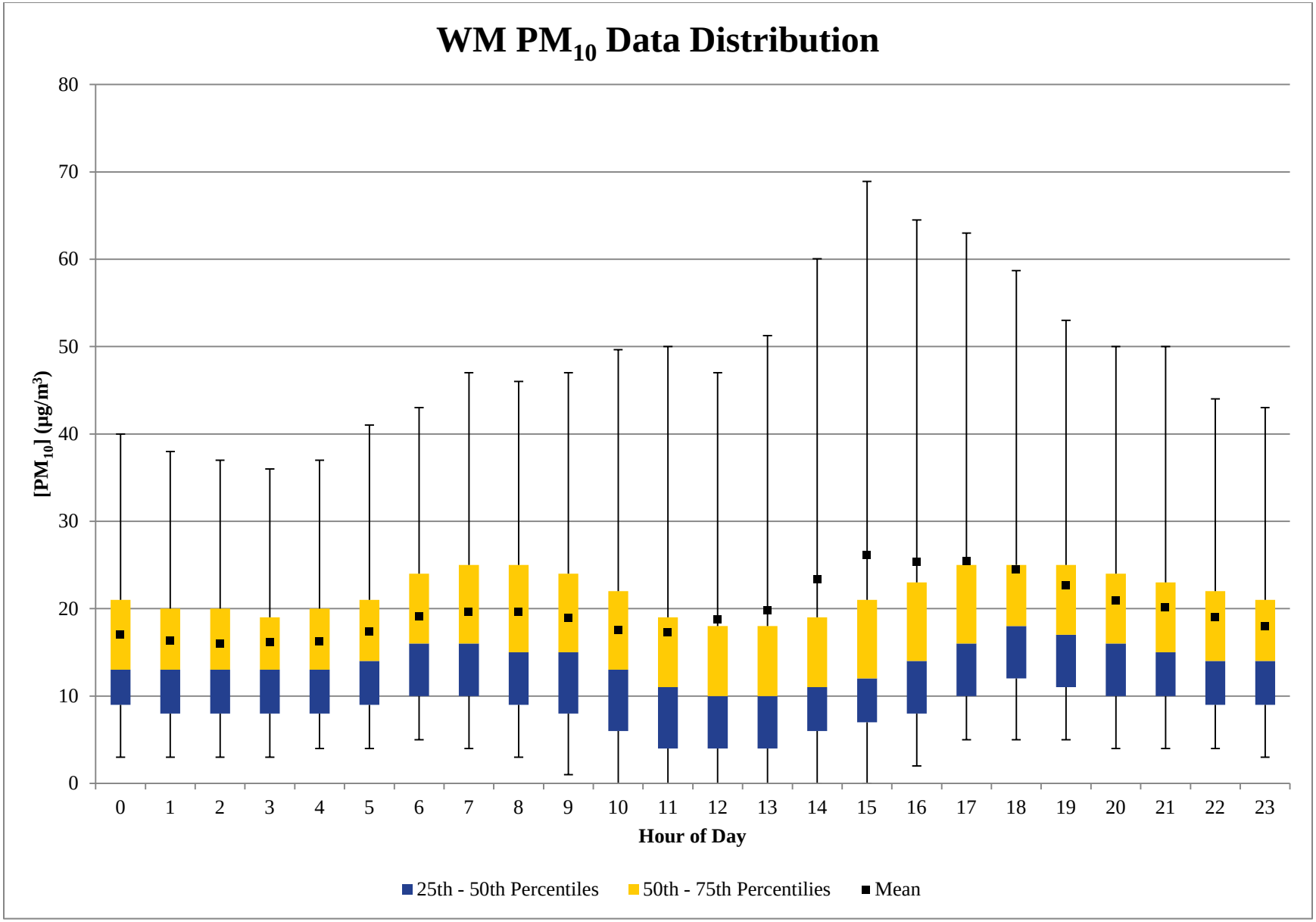


Figure C-8. PM_{10} data distribution from 2006-2010 for all data

Appendix D

Hourly Wind Speed Fluctuations

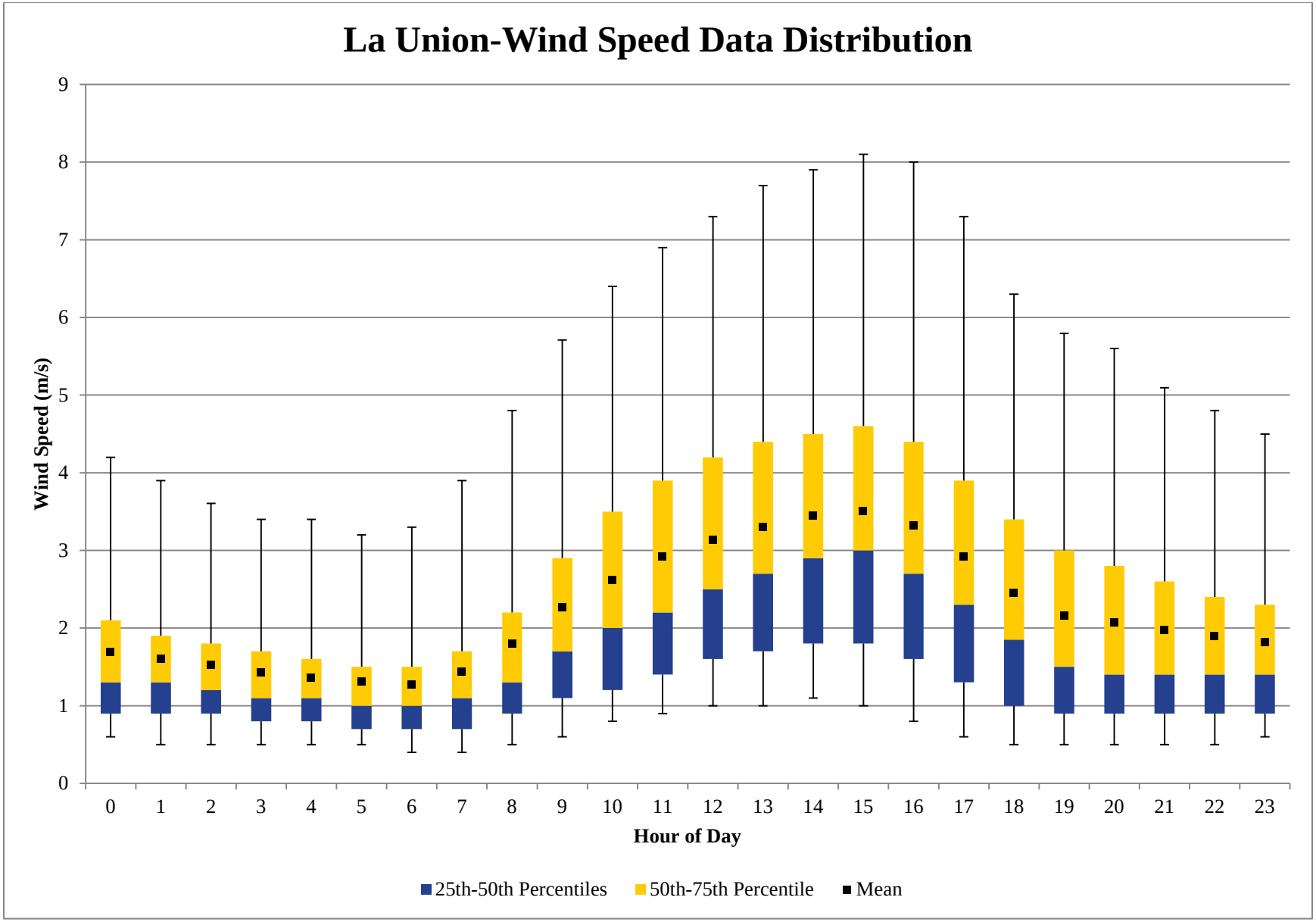
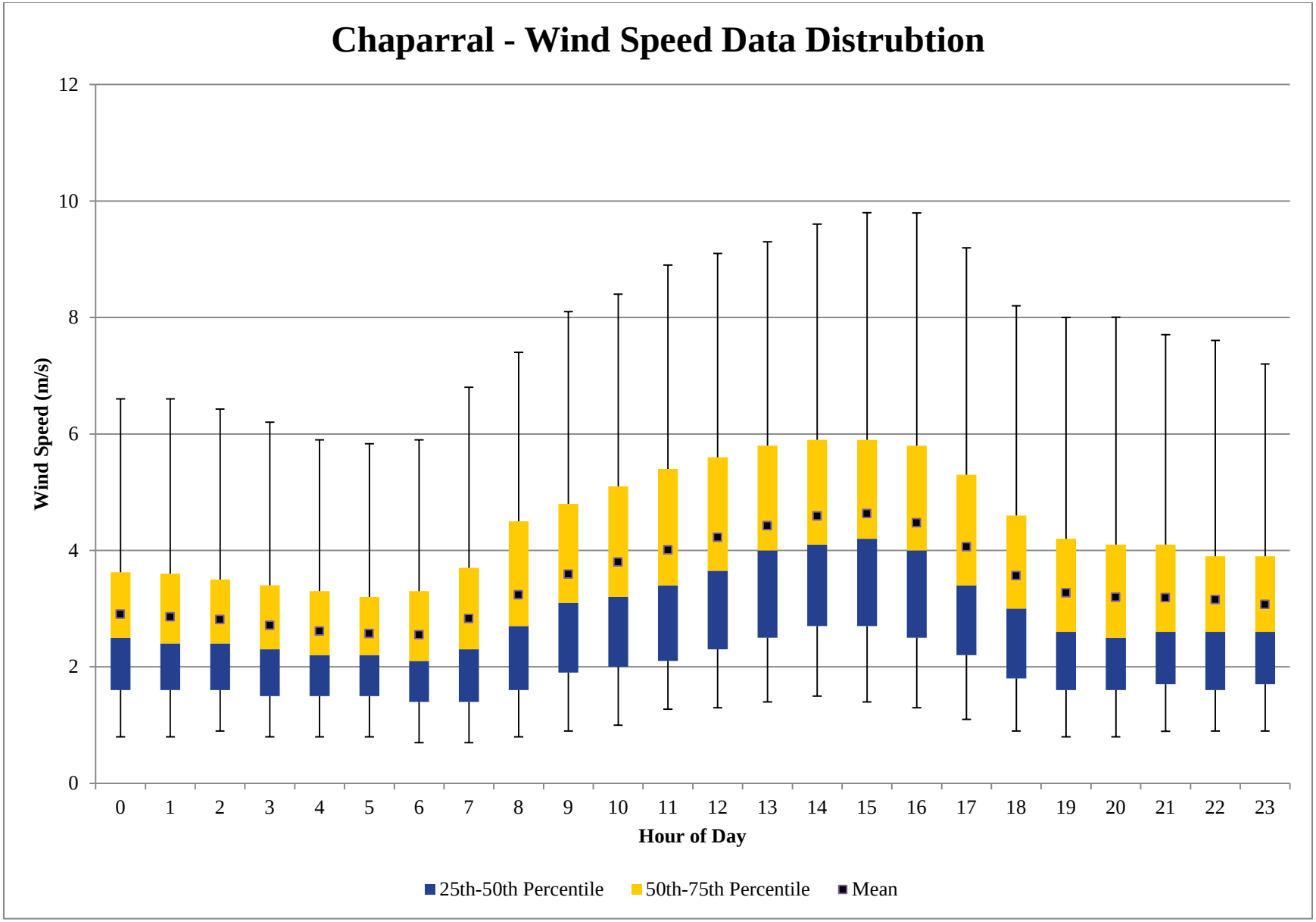


Figure D-1. Wind speed data distribution from 2006-2010 for all data



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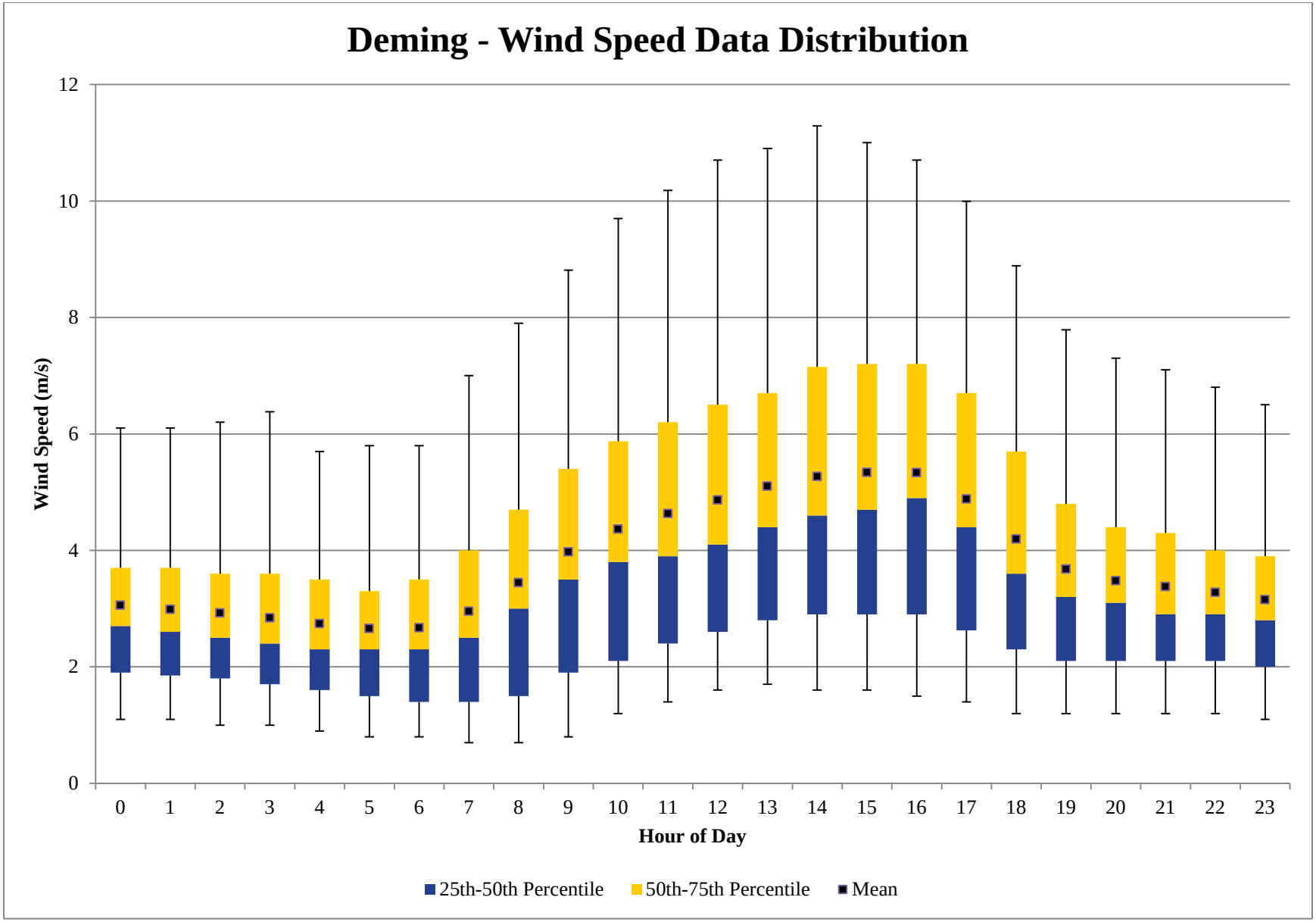

Figure D-3. Wind speed data distribution from 2006-2010 for all data

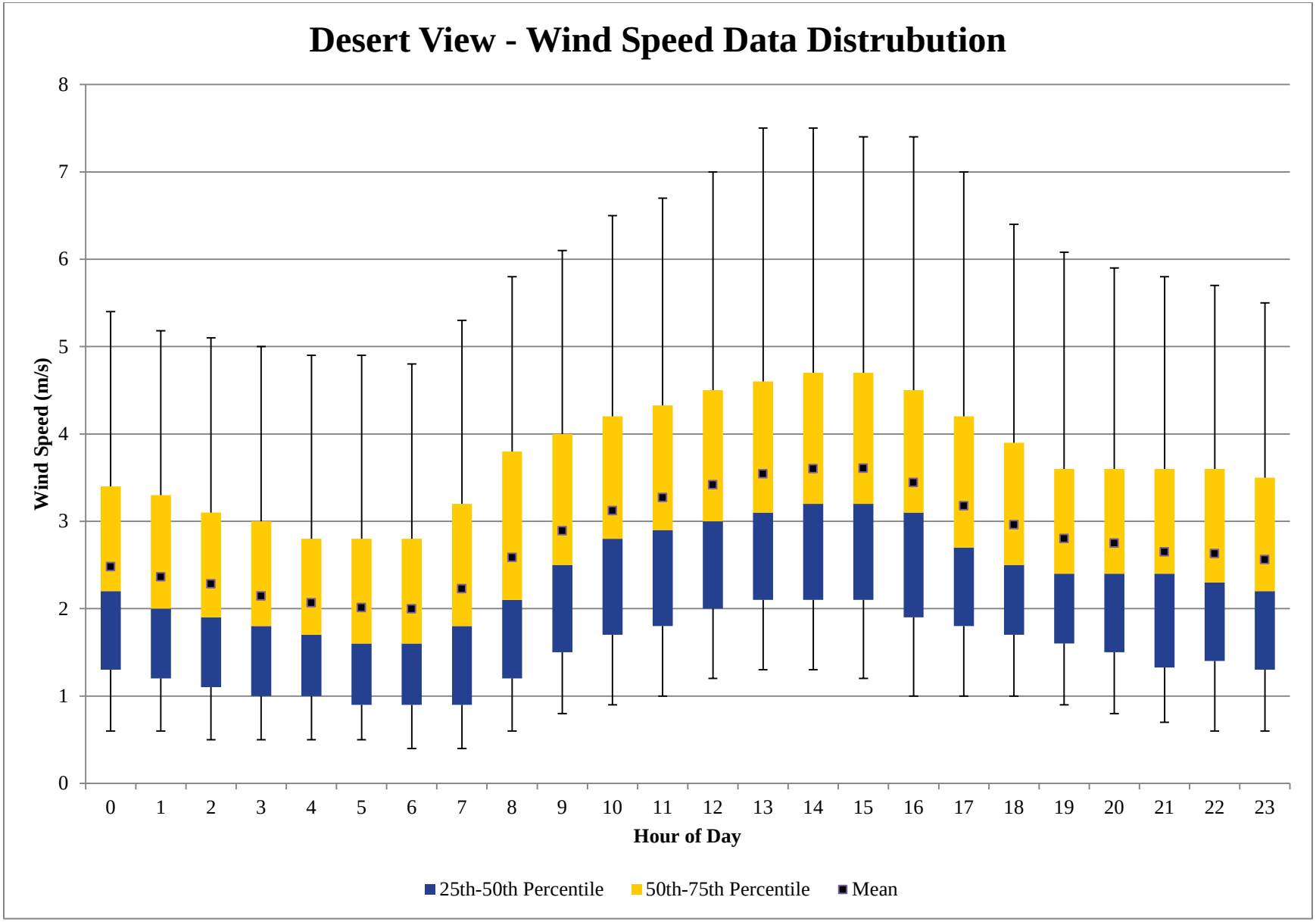

Figure D-4. Wind speed data distribution from 2006-2010 for all data

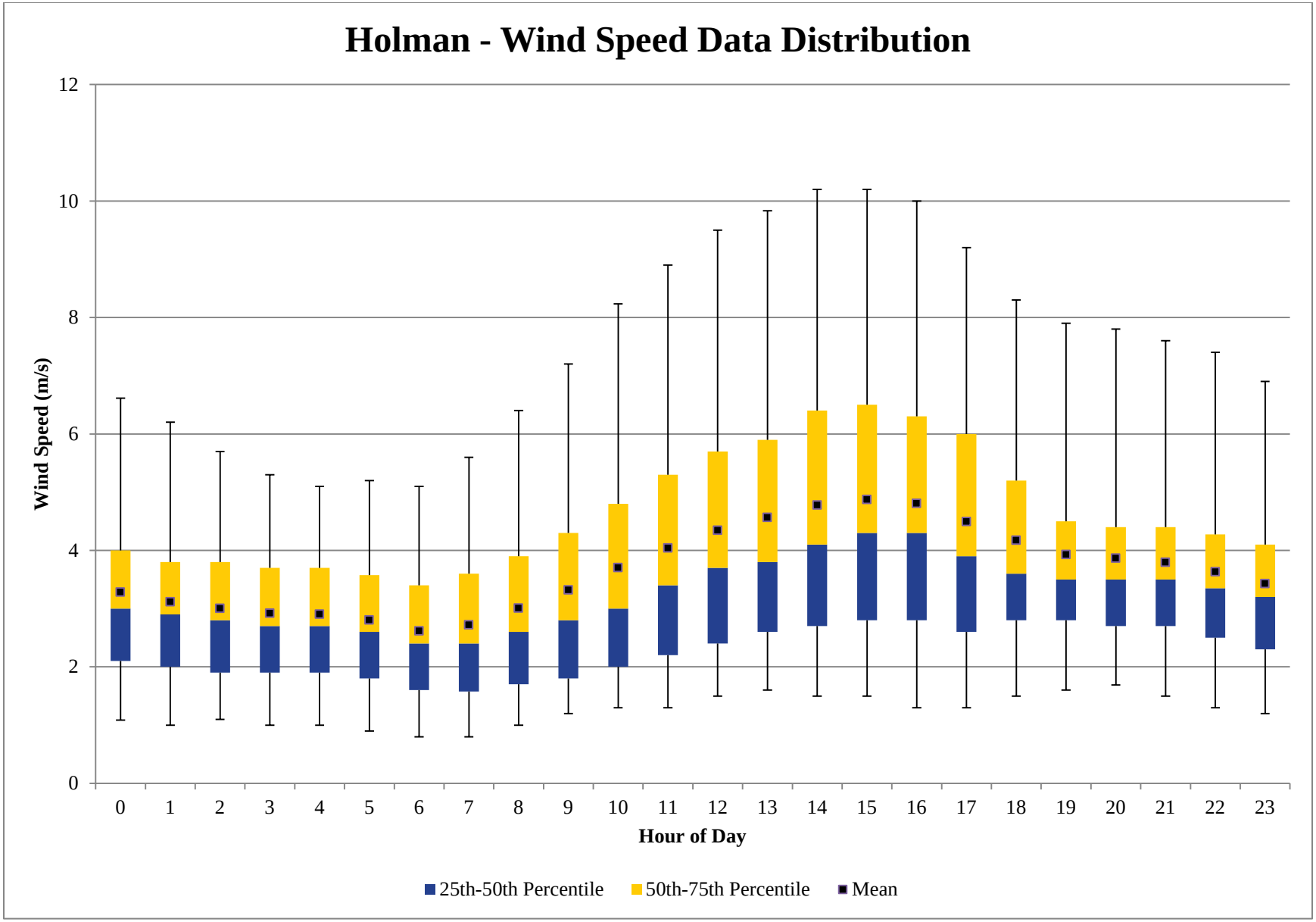

Figure D-5. Wind speed data distribution from 2006-2010 for all data

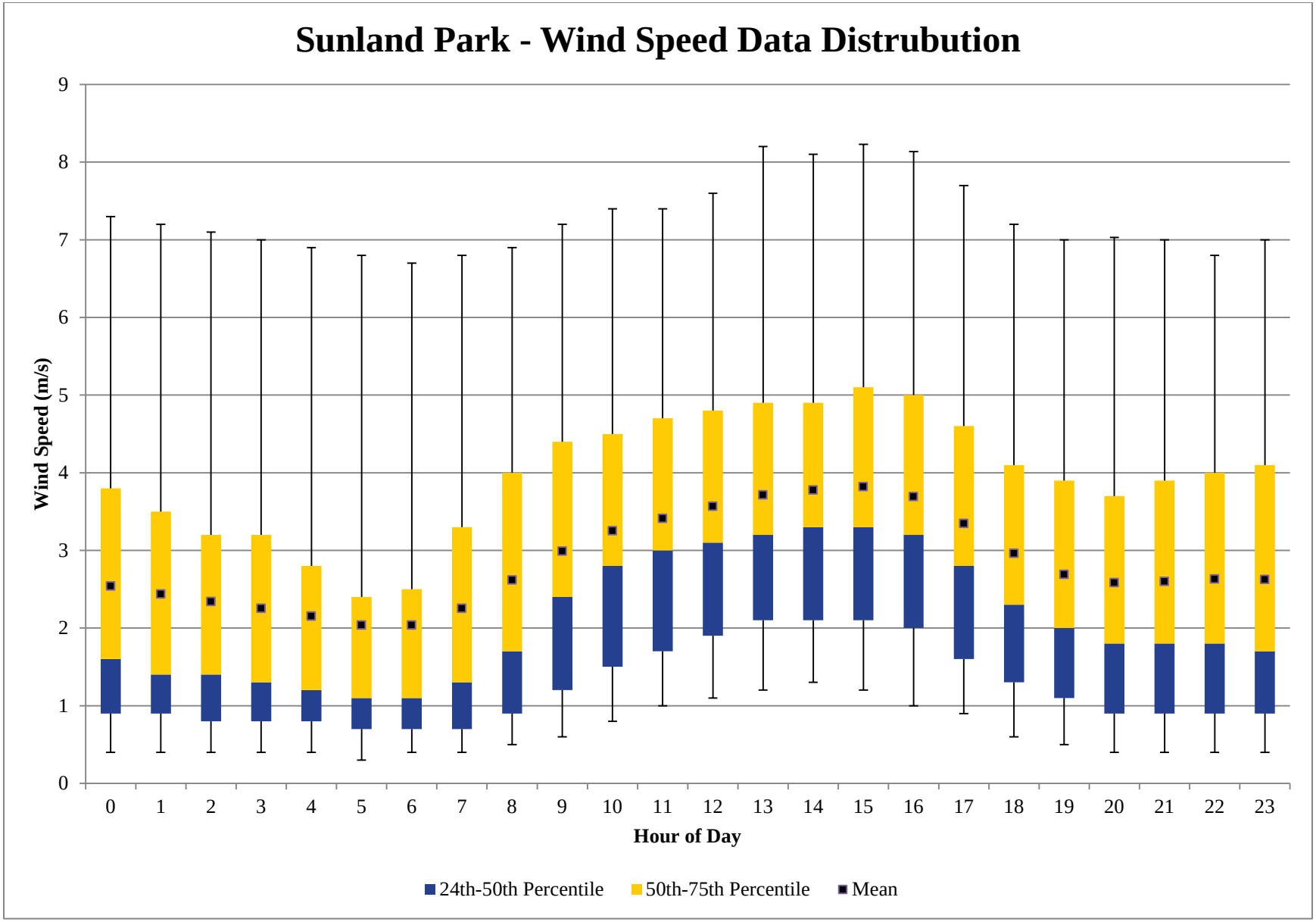

Figure D-6. Wind speed data distribution from 2006-2010 for all data

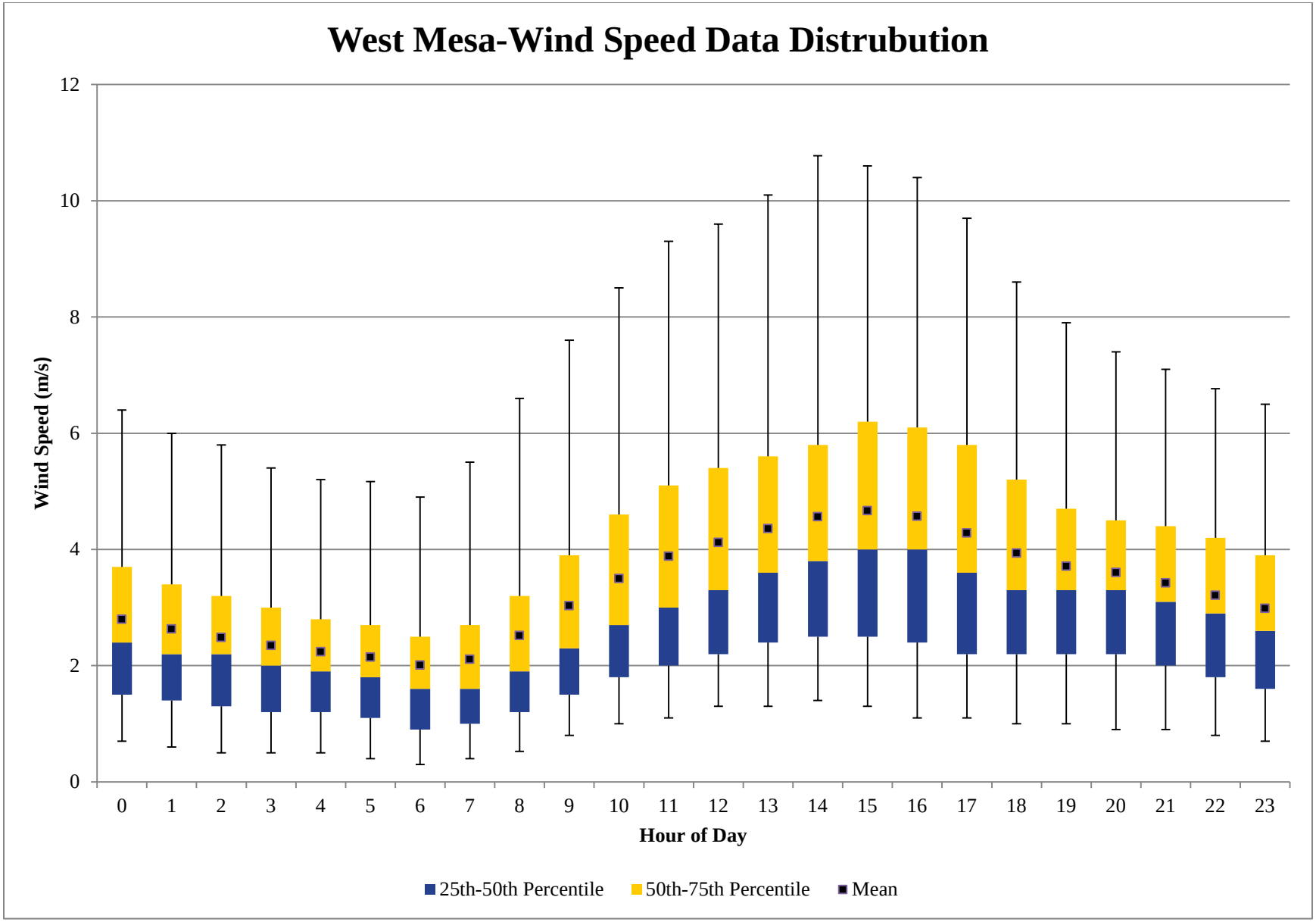

Figure D-7. Wind speed data distribution from 2006-2010 for all data

Appendix E

Hourly Wind Gust Fluctuations

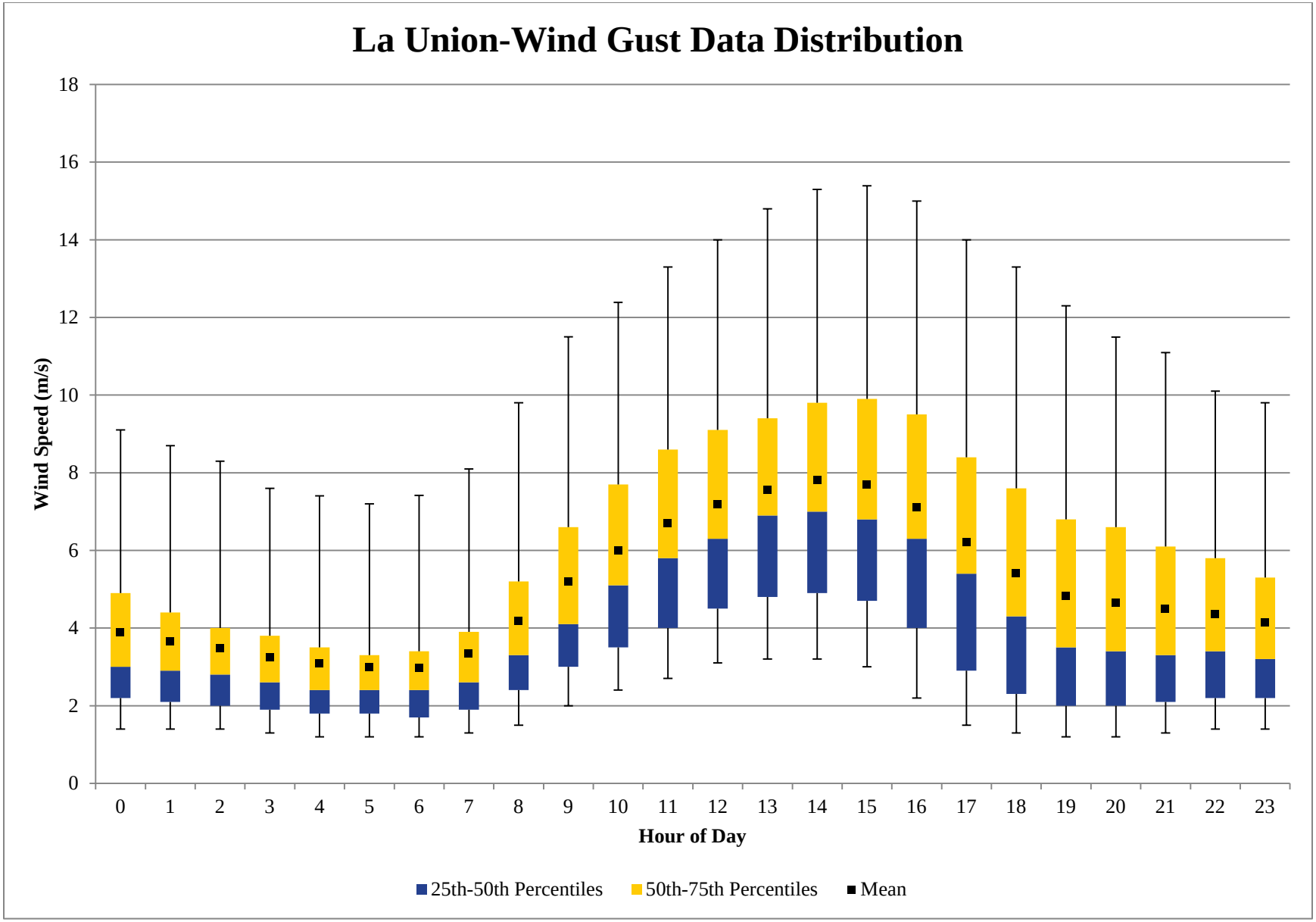

Figure E-1. Wind gust data distribution from 2006-2010 for all data

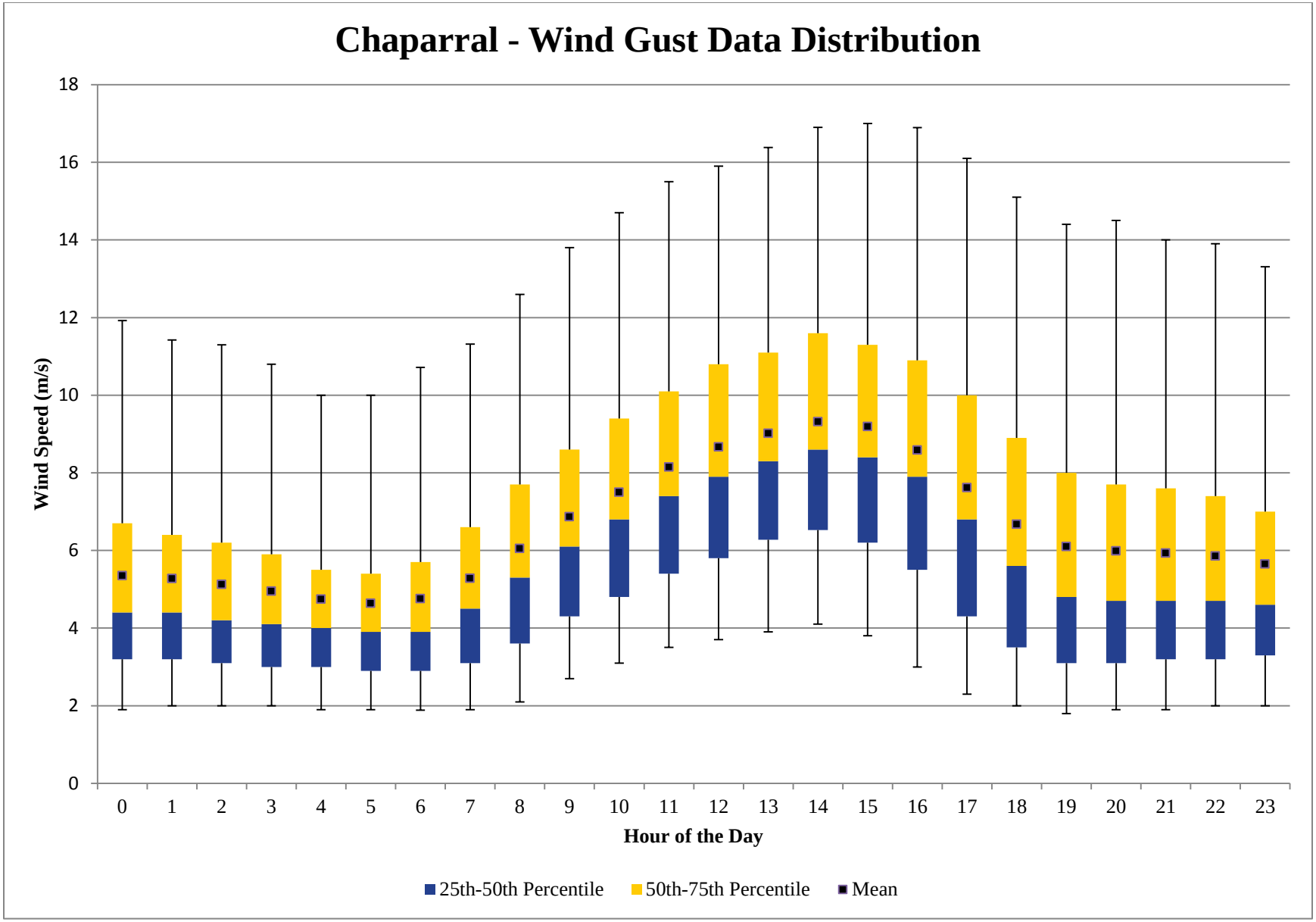

Figure E-2. Wind gust data distribution from 2006-2010 for all data

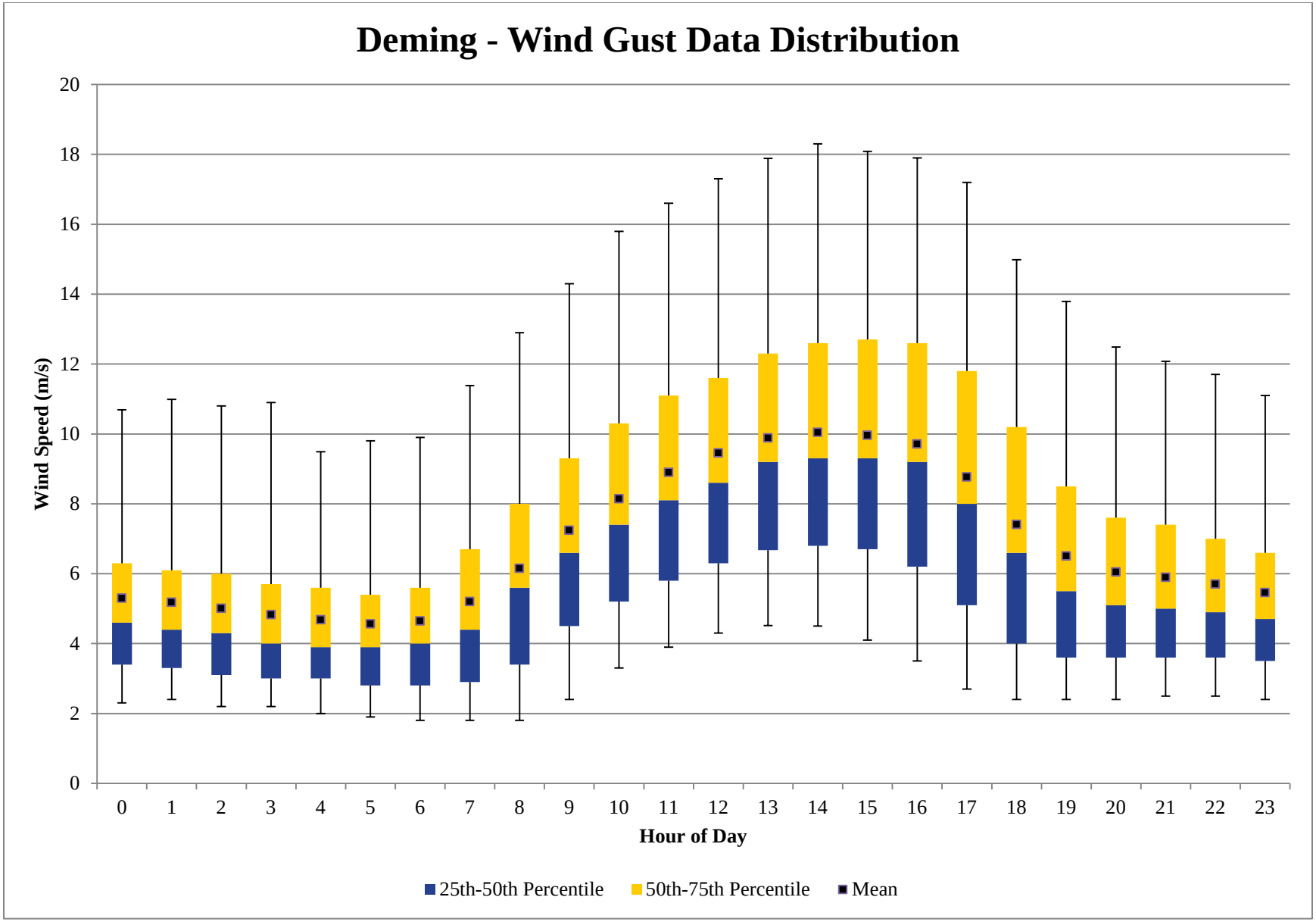

Figure E-3. Wind gust data distribution from 2006-2010 for all data

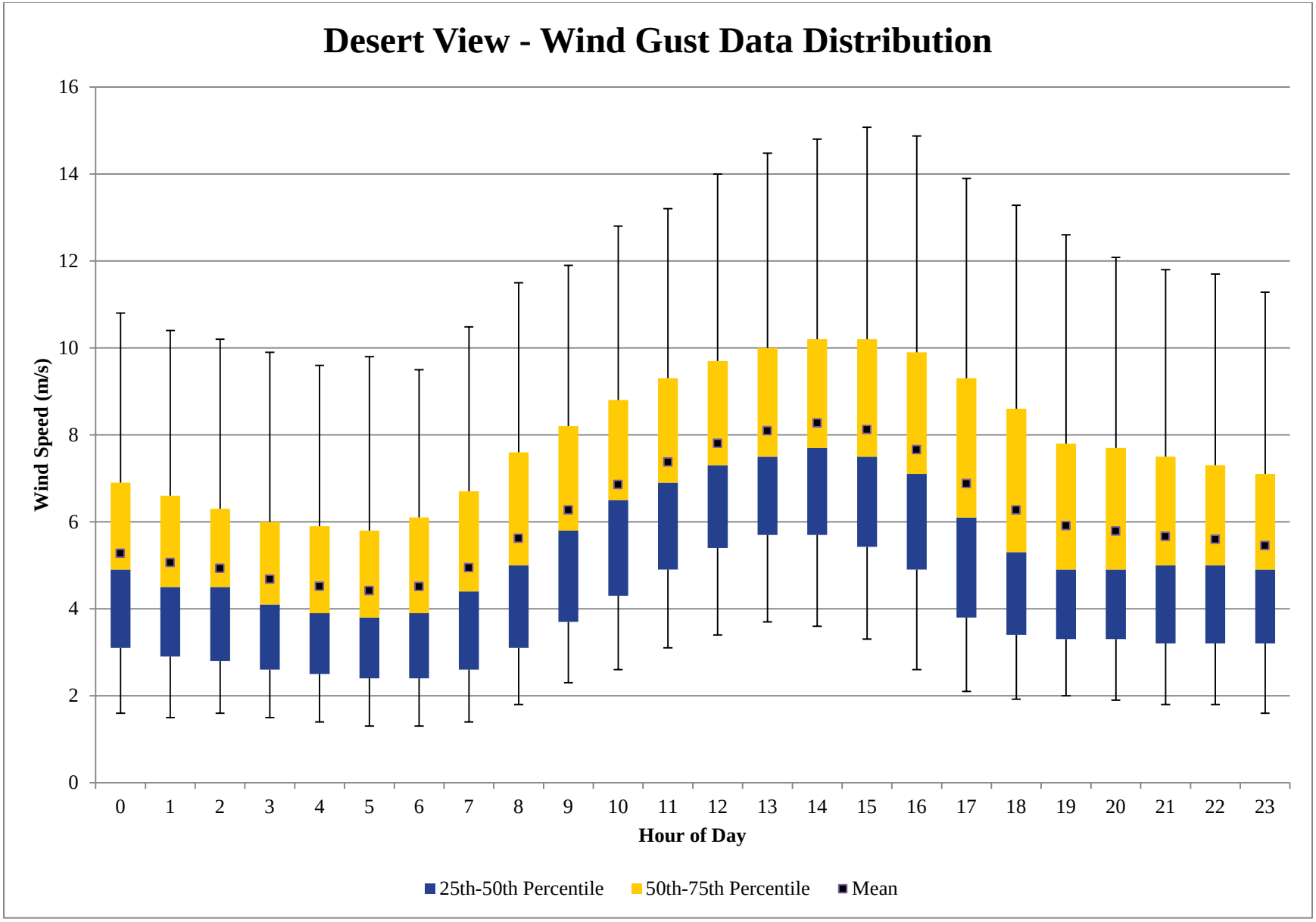

Figure E-4. Wind gust data distribution from 2006-2010 for all data

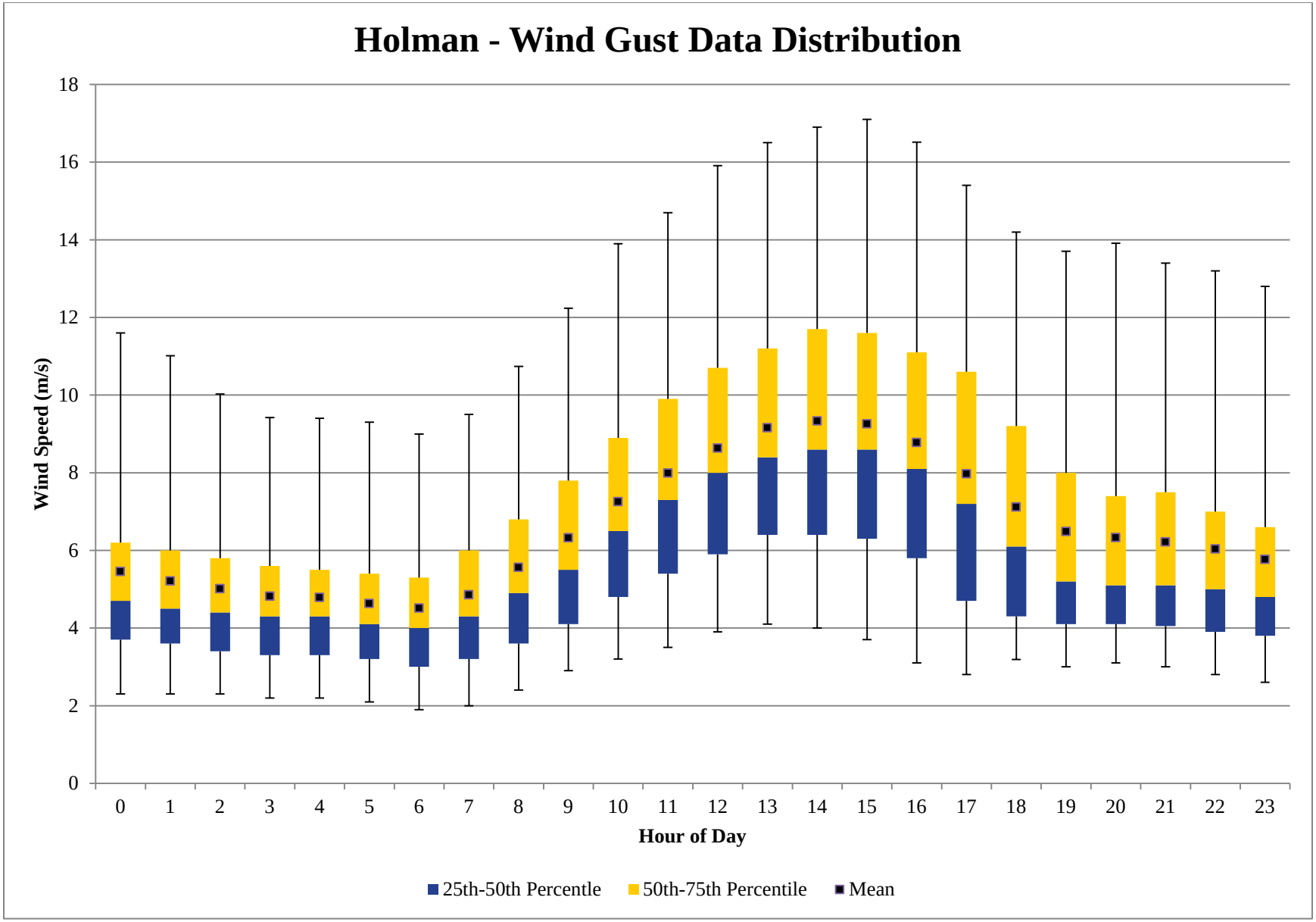

Figure E-5. Wind gust data distribution from 2006-2010 for all data

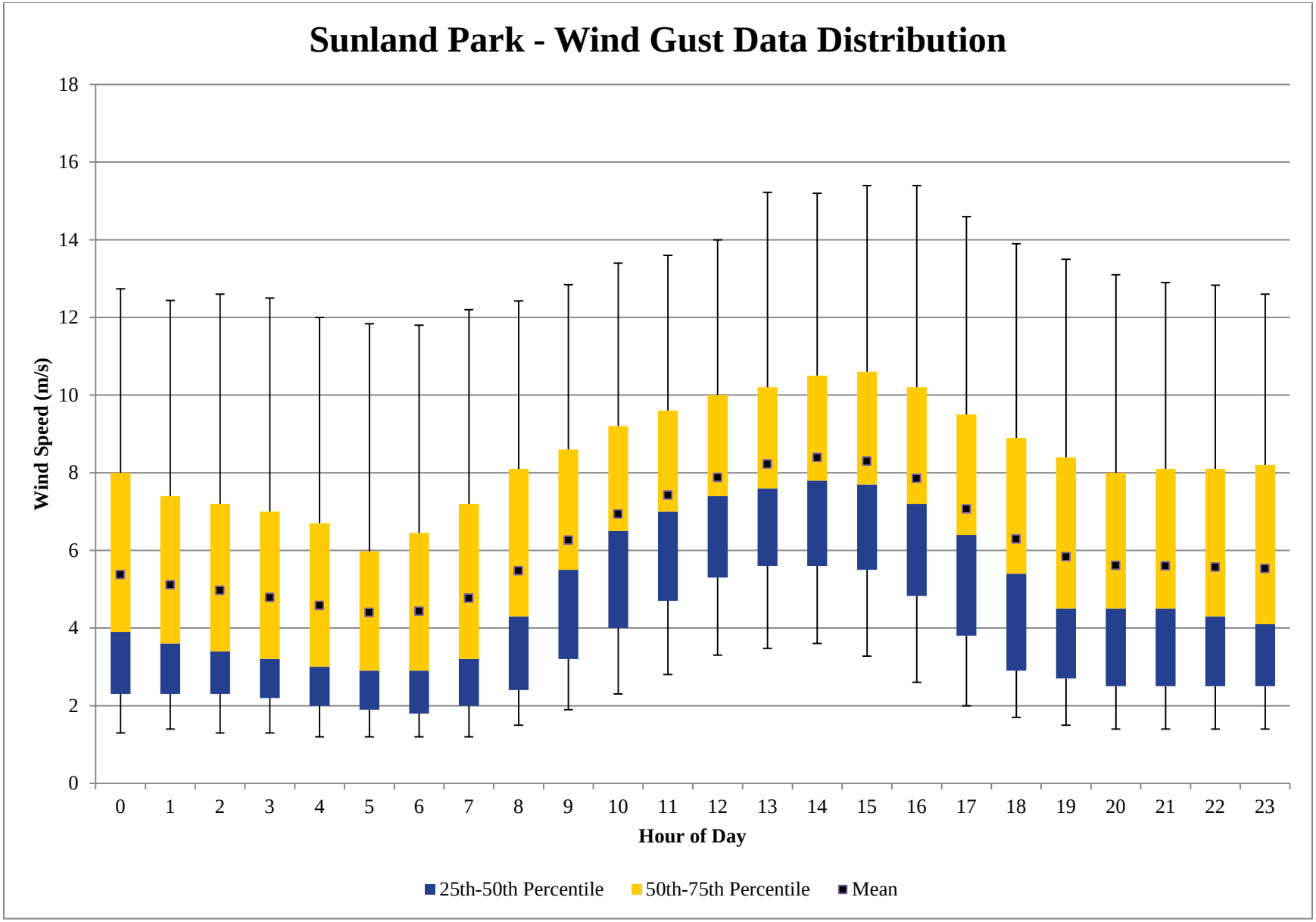

Figure E-6. Wind gust data distribution from 2006-2010 for all data

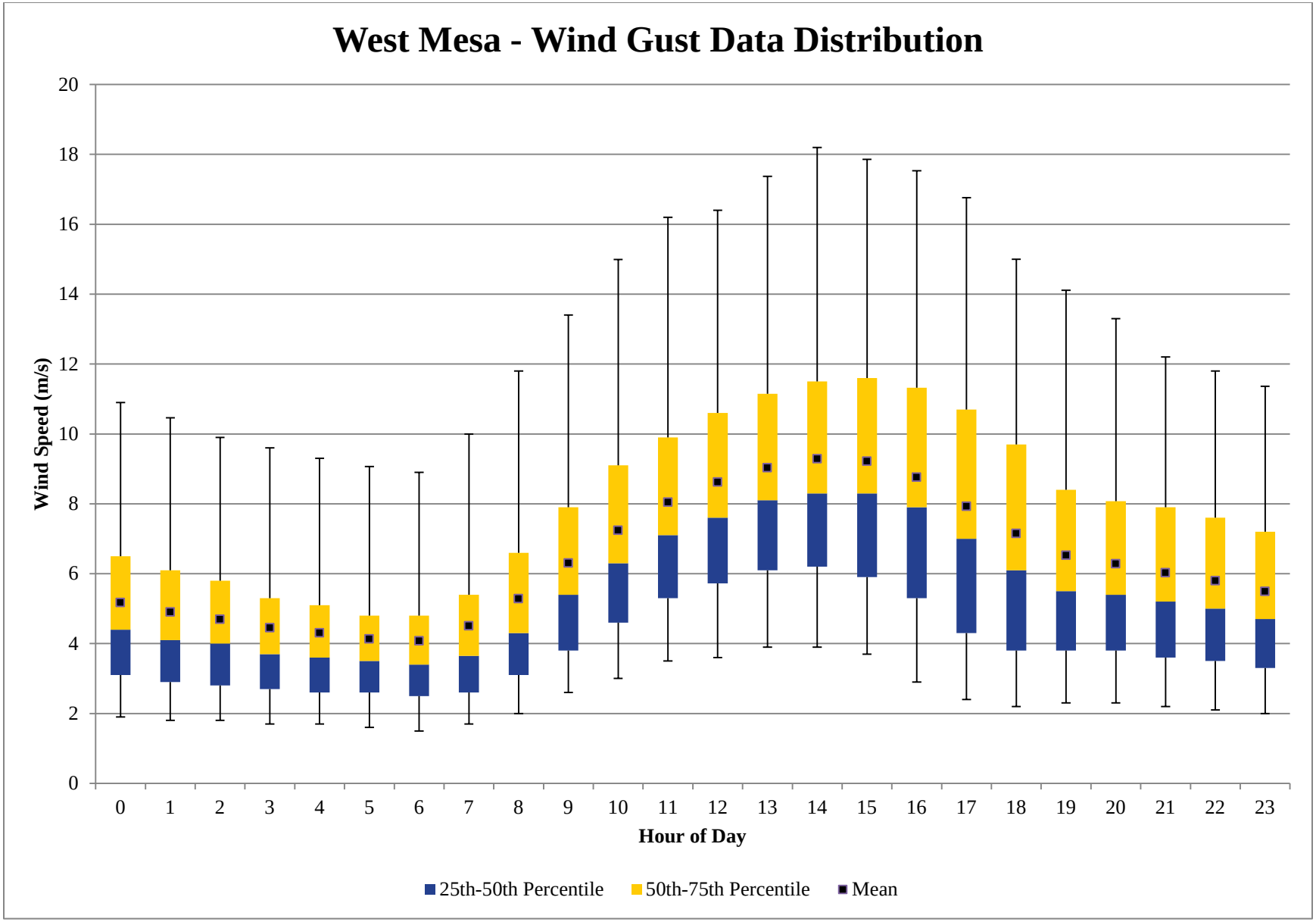

Figure E-7. Wind gust data distribution from 2006-2010 for all data

Appendix F

Public Notice and Comments

The NMED printed Public Notices in the Albuquerque Journal and Las Cruces Sun-News on October 25, 2013. The document was available in hard copy at the AQB in Santa Fe and the 23 field offices around the state. The public comment period ended on December 3, 2013 and no responses were submitted to the department. Affidavits of publishing can be found below.

www.lcsun-news.com

LAS CRUCES SUN-NEWS

PROOF OF PUBLICATION

I, being duly sworn, Frank Leto deposes and says that he is the Publisher of the Las Cruces Sun-News, a newspaper published daily in the county of Dona Ana, State of New Mexico; that the notice 53174 is an exact duplicate of the notice that was published once a week/day in regular and entire issue of said newspaper and not in any supplement thereof for 1 consecutive week(s)/day(s), the first publication was in the issue dated October 25, 2013 and the last publication was October 25, 2013

Despondent further states this newspaper is duly qualified to publish legal notice or advertisements within the meaning of Sec. Chapter 167, Laws of 1937.

Signed

Publisher
Official Position

STATE OF NEW MEXICO
ss.
County of Dona Ana
Subscribed and sworn before me this

28th day of October

Angel Ann Solis
Notary Public in and for
Dona Ana County, New Mexico

April 9, 2017
My Term Expires

OFFICIAL SEAL
ANGEL ANN SOLIS
Notary Public
State of New Mexico
My Comm. Expires 4/9/17

STATE ENVIRONMENT DEPARTMENT SEEKS PUBLIC COMMENT ON EXCEPTIONAL EVENTS DEMONSTRATION

(Santa Fe, NM) -The New Mexico Environment Department Air Quality Bureau has completed a draft exceptional events demonstration for periods exceeding federal air quality standards for particulate matter in southern New Mexico during calendar year 2011. This document demonstrates to the U.S. Environmental Protection Agency that smoke impacts from wildfires and dust storms generated by high winds, rather than man-made sources, caused exceedances of the national standard for particulate matter in the air. Without this demonstration, certain areas of the state would be in violation of federal standards and subject to stricter air quality rules and requirements designed to meet and maintain the standard in the future. The level of the federal air standards for particulate matter is protective of public health.

The New Mexico Environment Department is seeking public comment on the draft document through November 25, 2013. The document is available for review at the Environment Department's field offices and website at www.nmenv.state.nm.us/aqb or by contacting the Department at 1-800-224-7009.

For more information and to submit comments, please contact Michael Baca, Environmental Analyst, NMED Air Quality Bureau at (575) 524-6300 or at michael.baca1@state.nm.us.

Publication# 53174
Run Date: Oct 25,2013

RECEIVED
NOV 13 2013
Air Quality Bureau

AFFIDAVIT OF PUBLICATION

STATE OF NEW MEXICO
County of Bernalillo SS

Linda MacEachen, being duly sworn, declares and says that she is Classified Advertising Manager of **The Albuquerque Journal**, and that this newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chapter 167, Session Laws of 1937, and that payment therefore has been made of assessed as court cost; that the notice, copy of which is hereto attached, was published in said paper in the regular daily edition, for 1 times, the first publication being on the 25th day of October, 2013 and the subsequent consecutive publications on _____, 20____.

Linda MacEachen

Sworn and subscribed before me, a Notary Public, in and for the County of Bernalillo and State of New Mexico this 25th day of October of 2013

OFFICIAL SEAL
Sandra B. Gutierrez
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires: 2-18-17

Sandra B. Gutierrez

PRICE $42.47

Statement to come at end of month.

ACCOUNT NUMBER 1007594

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Journal: October 25, 2013